SHIRE OF OMEO

NATIONAL ESTATE PROGRAM 1977/1978

A PRELIMINARY STUDY OF THE CHARLOTTE SPUR TRACK THE JIRNKEE WATER RACE THE MOUNT HEPBURN TREATMENT WORKS AND THE ORIENTAL CLAIMS

Axedale Mining Co Pty Ltd
40A Canterbury Road, Camberwell, Victoria.

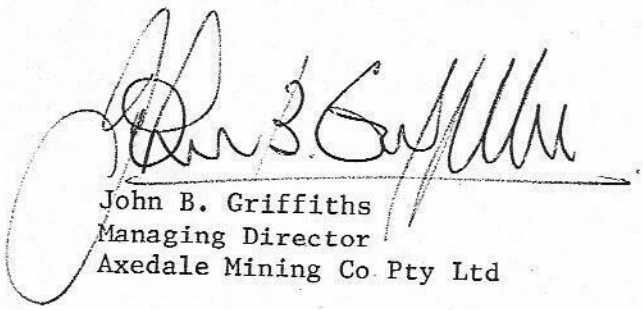
June 1978

CONTENTS

N O T E

This study has been directed and carried out for Axedale Mining Co Pty Ltd, and this report prepared by John B. Griffiths, Chartered Engineer, Member of the Institution of Engineers, Australia and Member of the Australasian Institute of Mining and Metallurgy.

Research assistance and review has been provided by Helen N. Griffiths.



John B. Griffiths
Managing Director
Axedale Mining Co Pty Ltd

June 1978

ACKNOWLEDGEMENTS

During the course of this study and for the purpose of the proper completion of this report, we have received valuable assistance from a number of persons.

In particular, we acknowledge the specific assistance of :

- The staff of the Latrobe Library, Melbourne, particularly for searching out certain of the photographs from yesteryear, reproduced within this report.

- John Knight, Assistant Director of Geological Survey with the Department of Minerals and Energy, for assistance with the provision of certain unpublished reports and the like. Also library and drawing office staff members of the same Department for their assistance in respect of published reports and plans.

- Ray Sumner, Historian with the National Parks Service, for the provision of certain present day photographs of the Charlotte Spur Track and the Mount Hepburn Treatment Works relics.

- Peter Sanders, Architect, for the provision of certain photographs related to the Oriental Claims in particular.

- Ewen Tyler of Tanganyika Holdings Ltd, for the provision of certain plans, etc. related to the Mount Hepburn/King Cassilis mine, and the surrounding area.

- Frank Garden of the Soil Conservation Authority for his observations upon the Charlotte Spur Track and the Oriental Claims.

- John Avery for a number of observations upon the Mount Hepburn/King Cassilis mine, in particular, and for access to a number of photographs, whether reproduced herein or not.

- Keith Fairweather for provision of a number of photographs, whether reproduced herein or not.

and

- Pat Corr of the Ministry for Conservation for his useful advice and encouragement.

DIGGER'S SONG

****

THE HILLS OF OMEO

I'll yard my hack, my swag I'll pack
To the hardy digger's haunts I'll go
Then choose a field that's sure to yield
Amongst the hills of O-me-o.

CHORUS:
O-me-o, O-me-o.
Rocky mountains clad with snow,
Scenes of joy to man or boy
The rugged hills of O-me-o.

Not to scorchy west, for nearest and best,
And where spring's sun melts the snow,
With unwearied zest, I'll pursue my quest
Amongst those hills of O-me-o.

CHORUS - O-me-o, O-me-o, etc.

Through lovely glade 'neath wattle shade
Where springs from marshy hillocks flow,
There birds make free in fern and tree,
Amongst those hills of O-me-o.

CHORUS - O-me-o, O-me-o. etc.

Though tracks be rough and ground be tough,
To try my luck away I'll go;
On sturdy steed I'll make good speed
Unto the hills of O-me-o.

CHORUS - O-me-o, O-me-o, etc.

By flowing rill or snow peaked hill
With determined hope I'll go,
Yes; and never stick till gold I pick
From off those hills of O-me-o.

CHORUS: O-me-o, O-me-o.

****

Composed by W. Waldron of Melbourne in praise of the Omeo region and its gold discoveries during the time of the rush to the Western Australian goldfields in the 1890's.

1 INTRODUCTION AND DEFINITION

1.1 Appointment of Consultant

By letter of 23rd February, 1978 the Shire of Omeo confirmed the appointment of Axedale Mining Co Pty Ltd to carry out a Preliminary Study of Mining Sites in the Omeo Region.

The study has been carried out as part of the National Estate Program 1977/1978 funded by the Commonwealth Government, and administrated in Victoria by the Ministry for Conservation.

1.2 Scope and Purpose of Study

The Preliminary Study now completed and reported up herein embraces as was required, four distinct subjects, namely :

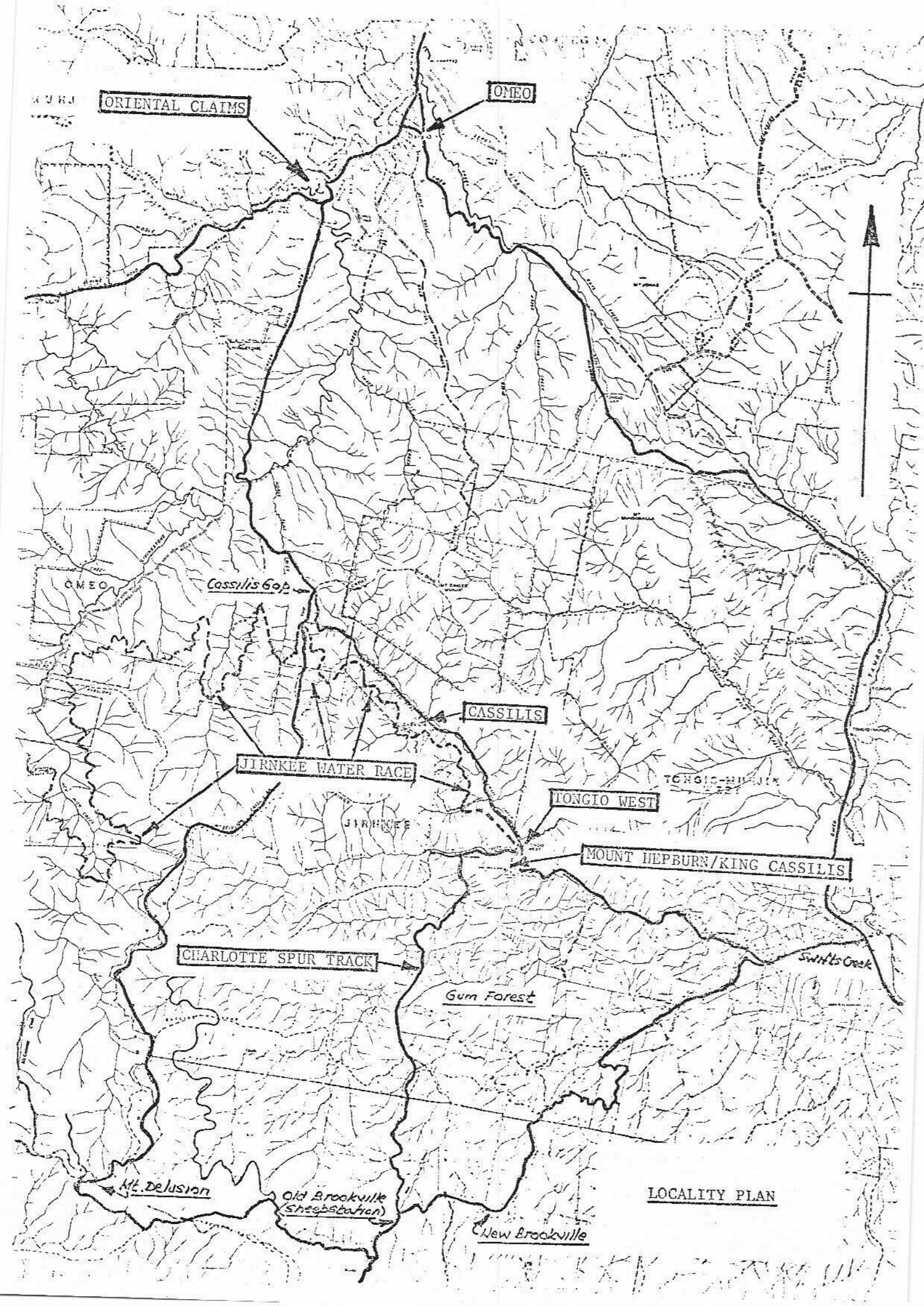
- The Charlotte Spur Track, via Tongio West
- The Jirnkee Water Race, via Tongio West
- The Mount Hepburn Treatment Works, Tongio West

and

- The Oriental Claims, Omeo.

The primary purpose of the Preliminary Study as defined and confirmed to Axedale Mining was to :

- Determine and report upon the history of the subject features.
- Assess and evaluate the significance of the features in an historical context.
- Assess and evaluate the physical attributes of the subject features and their worthiness and capacity for preservation and/or restoration.
- Provide recommendations for action involving only short term minimal capital outlay.


ORIENTAL CLAIMS
OMEO
OMEO
Cassilis Gap
CASSILIS
JIRNKEE WATER RACE
TONGIO WEST
MOUNT HEPBURN/KING CASSILLIS
CHARLOTTE SPUR TRACK
Gum Forest
Swifts Creek
Mt. Delusion
Old Brookville (Sheepstation)
New Brookville
LOCALITY PLAN

1.3 Format and Content of Report

The report is divided into three sections, namely :

- This introductory section defining the bases on which the study has been carried out, together with summary of pertinent recommendations of the Land Conservation Council in respect of the Alpine Area.

- Section 2 which summarises what has been found and assesses both the significance of the features in an historical context and their worthiness and capacity for preservation and restoration.

- Section 3 which provides recommendations for action based upon the assessments of Section 2, but constrained to fit a short term programme involving minimal capital outlay.

  Some suggestions are also provided within Section 3 in respect of a limited number of other historic mining sites and areas in the Omeo region.

and

- Finally, an illustrated historical review and commentary upon each of the four subject features.

Due to the complete absence of comprehensive official bulletins, memoirs or studies upon the four subject features, it has been necessary to research these almost from scratch in order to assess their significance.

The Consultant concluded that retention of this original research was desirable in a form as reasonably complete as possible, since in particular it could well be of assistance to the Shire should they decide to proceed as later recommended.

Consequentially, the reader will find that the largest segment of this report volume consists of the historical reviews and commentaries.

1.4 Units of Measure

English/Imperial units of measure are used throughout this report, except in instances related to leases, recommendations, etc., recorded currently in metric measures.

Where ounces of gold are recorded, these are troy ounces in accordance with former normal industry practice. Tonnages quoted are in terms of long tons.

Original money figures quoted are in Pounds (£), Shillings and Pence, although in a very few instances, the equivalent in today's value has been quoted in terms of Australian Dollars ($). Where current values of gold production are quoted, these are based on a value of $150 per ounce.

Metric and English Equivalents

Metric	English	English	Metric
1 metre (m)	3.28 feet	1 foot	0.30m
1 kilometre(km)	0.62 mile	1 mile	1.61km
1 hectare(ha)	2.47 acres	1 acre	0.40ha
1 gram(g)	0.64 dwt.	1 dwt.	1.56g
1 kilogram(kg)	32.15 ozs(troy)	1 oz.(troy)	31.10g
1 tonne(t)	0.98 ton(long)	1 ton(long)	1.02t
1 gram/tonne	0.65 dwts/long ton	1 dwt/long ton	1.53g/t

1.5 Land Conservation Council, Victoria

In April 1978, since the commencement of the subject study, the Land Conservation Council, Victoria, published their proposed recommendation in respect of the Alpine Area.

One of the recommendations is that an area of 3,620 hectares to the South-west of the Tongio West-Cassilis Gap Road be permanently reserved as an historic zone under the management of the National Parks Service.

The area covered by the recommendation contains the Mount Hepburn Treatment Works and parts of both the Charlotte Spur Track and the Jirnkee Water Race as well as many other sites and features of interest.

Should this recommendation be accepted then in time, but most likely a fair time from now, significant actions as to preservation and possibly restoration may well be undertaken there without cost to the Shire of Omeo.

The recommendation of the Land Conservation Council in respect of the Historic Zone reads as follows:

"HISTORIC ZONE"

"Sites of historical importance, associated with the mining boom of the late 1800s and early 1900s are found throughout the alpine area. Two areas in differing gold-bearing regions have been recommended for inclusion in the Historic Zone. Each contains features that are important in illustrating the techniques for mining and processing gold-bearing ore and showing the life styles associated with early mining. They include remnants of dwellings, mining tracks, water races, shafts, tunnels, and processing equipment.

Council believes that these areas should be managed to provide for public education associated with the history of gold-mining. The Council points out that other significant historical features are known to exist elsewhere in the Alpine Reserve, and these should be catalogued, researched, and protected from further damage. "

"Recommendations"

"A65-A66

That the areas listed below be used to :

(a) protect the sites and the remnants of buildings, mining equipment, water races and artifacts associated with the mining history of the locality

that

(b) mineral exploration and mining be permitted where it does not conflict with (a) above and in accordance with the policy set out in section L, Mineral and Stone Production*

*(not included herein - J.B.G).

(c) fossicking be permitted using methods approved by the managing authority where this does not conflict with (a) above

(d) the land be available for educational and recreational activities where this does not conflict with (a) above

(e) harvesting of forest products not be permitted

(f) apiculture and grazing be permitted

and that the areas be permanently reserved under section 14 of the Land Act 1958 as part of the Alpine Reserve, with A65 managed by the Forests Commission and A66 managed by the National Parks Service.

NOTE: Management of both areas should be in consultation with the Department of Minerals and Energy."

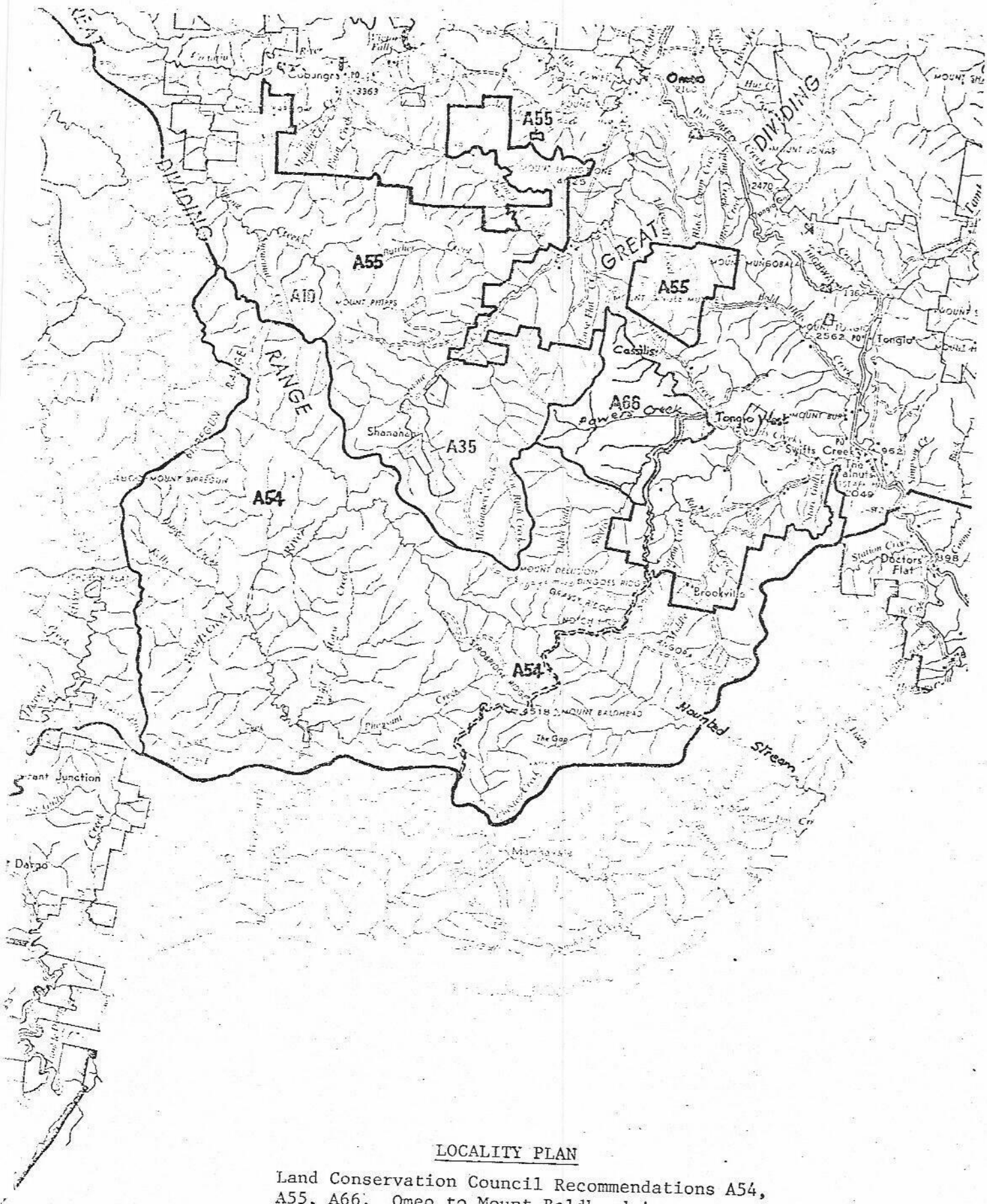
"A66 Cassilis (3,620 ha)

This area adjoins the existing townships of Cassilis and Tongio West and includes the site of the first quartz reef discovered in Gippsland. The gold-bearing ore was found to be highly mineralized and required a series of treatments including crushing, reduction, and roasting to ensure high yields.

One of the larger companies carted ore along a gravity activated tramway from mines on top of the range to a battery and treatment plant situated in Powers Gully. The plant, fuelled initially by timber and then by oil, was converted to electricity in 1909. Power was supplied by a hydroelectric generating plant - the first in Victoria - constructed at the Victoria Falls.

A gold-sluicing company constructed the Jirnkee water race, which brought water 90 km from the head of the Wentworth River to the sluicing works at Tongio West.

Two of the richest mines, the Cassilis and the King Cassilis, are covered by current mining leases and are worked intermittently. "



LOCALITY PLAN

Land Conservation Council Recommendations A54, A55, A66. Omeo to Mount Baldhead Area.

In addition the Land Conservation Council has also recommended the permanent reservation under their designated General Use Zone of a number of other areas, two of which are particularly relevant to this report. These are recommendations A54 Wentworth of 44,660 hectares, and A55 Livingstone-Bundara of 69,750 hectares and are intended to be under the management of the Forests Commission.

The parts of the General Use Zone recommendations most pertinent to this report read as follows :

"GENERAL USE ZONE"

"This covers the largest area of any of the zones and is to be managed for multiple use, including water production, hardwood logging, forest grazing, and apiculture, ... "

"Recommendations"

"A50-59

That the areas listed below and shown on the map be used to :

(a) provide opportunities for open-space recreation and education, where recreation would include activities such as bushwalking, camping, fishing, canoeing, fossicking, deer-hunting, horse-riding, four-wheel-drive touring, trail-bike riding, and the various forms of passive recreation (see notes 1, 2, 3 and 4)

(b) supply water and protect catchments and streams

(c) produce hardwood timber in accordance with the principles outlined in section C, Hardwood and Timber Production*, which aim at protecting other values and uses in and around logging areas.

(d) provide forage for grazing in accordance with the policies and conditions specified in section K, Agriculture*

(e) produce honey, gravel, sand, and other forest produce as defined under the Forests Act 1958 (see note 5)

(f) conserve native plants and animals

(g) protect sensitive components of distinctive landscapes that are a matter of public concern and may be seen from popular viewing points

(h) protect the environs of popular walking tracks, driving routes, look-out points, waterfalls, or other beauty spots

(i) protect historic sites and relics that are the property of the Crown

(j) protect particular values as listed below in the 10 divisions of the zone according to the principles and guidelines outlined for various uses dealt with in sections on Hardwood Timber Production, Agriculture, Mineral and Stone, and Recreation* (in listing viewing points it should be noted that some logging areas and roads will be visible from them, but protection of sensitive landscape components will reduce the visual effects)

that

(k) the Fisheries and Wildlife Division prepare plans for the conservation of wildlife in consultation with the management authority and, after mutual agreement, these be incorporated into the management plan

and that the areas be permanently reserved under Section 14 of the Land Act 1958, as part of the Alpine Reserve, and managed by the Forests Commission. "

NOTES:

1 The use of four-wheel-drive vehicles and trail-bikes should be in accordance with legal requirements and regulations as referred to in more detail in section I, Recreation*.

2 In addition to allowing dispersed or bush camping throughout most of the zone, in areas suitable for more intensive use (such as at Wrens Flat, Eagle Vale, Anglers Rest, Staleyville, Harrietville, and Nariel, and along the Wellington and Gibbo Rivers) the management authority should provide camping facilities to cater for larger numbers of people. Along major tourist routes (such as adjacent to the Omeo Highway at the Mitta Mitta River crossing and the Alpine Way near the Victoria River crossing), picnicking facilities in pleasant surroundings away from the road environment should be established to cater for the travelling public.

3 Fossicking should be permitted, using methods approved by the management authority, in areas where this activity does not conflict with water catchment, nature conservation, and historic values.

4 The use of hounds for deer-hunting should be permitted in this zone.

5 The use of areas within this zone for mining exploration and for extraction for sand and gravel should be in accordance with the principles and guidelines set out in section L, Mineral and Stone Production*. "

"A54 Wentworth (44,660 ha)

In accordance with (j) above, the following values should be protected :

(a) Dargo-Omeo mining track, Jirnkee water race, relics that are the property of the Crown, and sites associated with early mining at the old township of Brookville and in the Haunted Stream; old sawmill site and tramway near Mount Baldhead

(b) herbfield and adjacent alpine ash environs at Mount Baldhead; herbfields, heathland, black sallee woodland, and adjacent alpine ash environs at Mount Delusion; manna gum forests along river flats

(c) Sticherus flabellatus - Pheasant Creek headwaters. "

"A55 - Livingston-Bundara (69,750 ha)

In accordance with (j) above, the following values should be protected:

(a) Jirnkee water race, Dargo-Omeo mining track, relics that are the property of the Crown, and sites associated with early mining around Mount Gingee Munjie, Glen Valley, and Glen Willis.

(b) Grevillea willisii near Anglers Rest and Eucalyptus neglecta on Spring Creek. "

SPECIAL NOTE:

* An asterisk as shown indicates that reference not included herein and that details will be found in L.C.C. Proposed Recommendations, Alpine Area, April 1978.

In respect of the General Use Zone, it seems most unlikely that the Forests Commission would have the desire, motivation or necessary experience and discipline training to undertake adequate preservation or restoration of mining sites and relics within the zone. However, they will without doubt, in time, as elsewhere, provide appropriate facilities for visitors to the subject areas, including the maintenance of tracks and the provision of signposting and it is to be hoped that they will employ appropriate personnel in respect of preservation or restoration of mine sites and relics.

The L.C.C. recommendation areas as noted and pertinent to this, the Consultant's Report, are shown on the map included herewith.

Other relevant L.C.C. recommendations which, however, have either no significant influence upon the Consultant's recommendations or provide for no change in use, are

- In N1, that the proclaimed township of Brookville (Sheepstation) be rescinded and thus effectively the site would fall within L.C.C. recommendation A54, earlier noted.

- In Q1, that the existing use and tenure of the Oriental Claims Reserve, a Recreation, Tourist and Museum Reserve, continue.

2 ASSESSMENT SUMMARIES

2.1 The Charlotte Spur Track

What is now termed the Charlotte Spur Track is a part only of the Bairnsdale - Mount Baldhead - Omeo Road, intended originally to be a major trade route between Bairnsdale and the shortlived tinfields and the goldfields to the north.

Historical

The early foot tracks, the bridle or pack tracks and the later dray track, as well as the road now known as the Charlotte Spur Track, owe their presence variously to the need for access between and to the mining sites and centres in both the immediate vicinity of the Charlotte Spur and at much greater distances.

The mining developments and the consequential development of the tracks and the road itself are unfolded in some reasonable detail in the illustrated historical review and commentary provided later in this report.

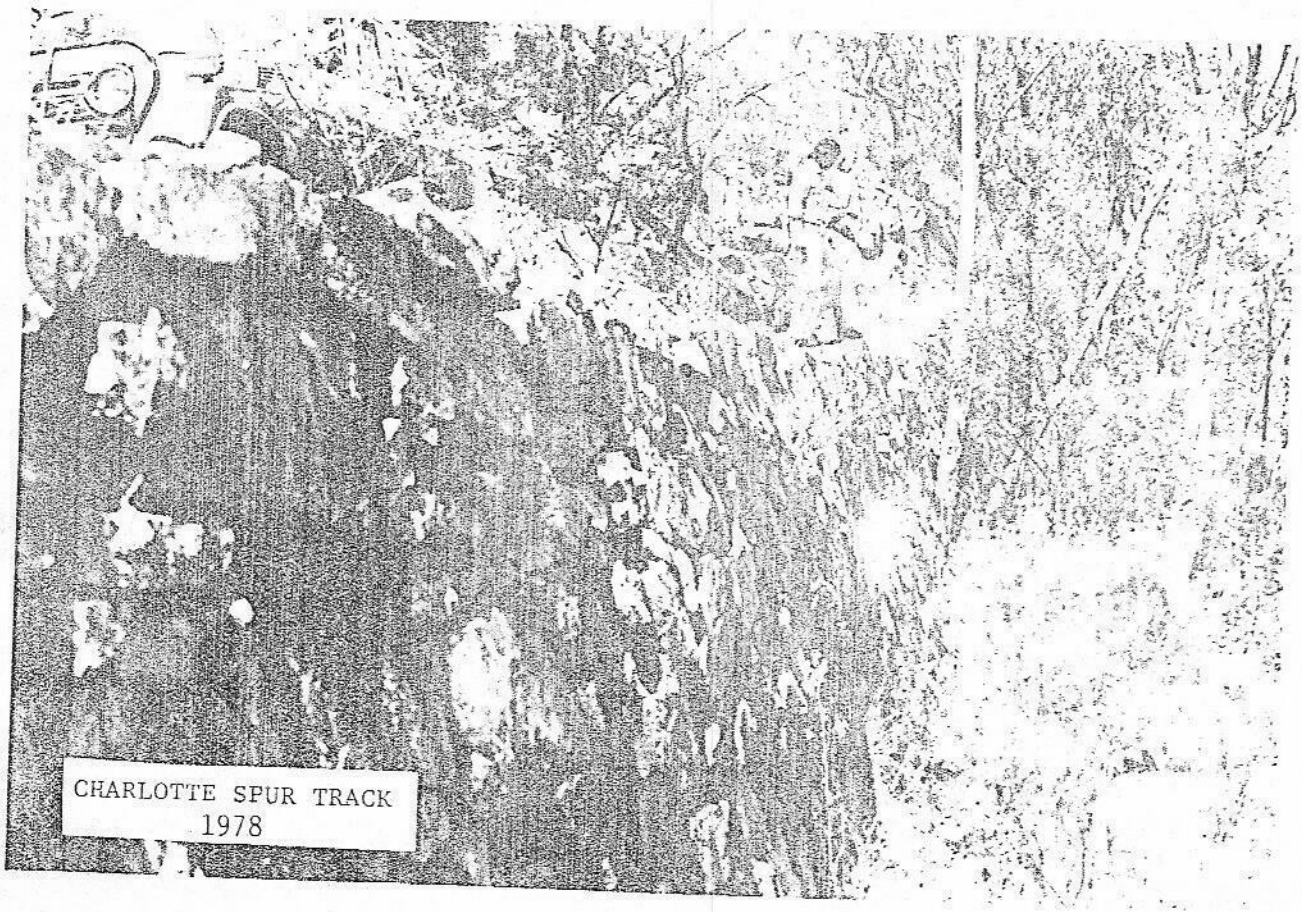
In respect of the Charlotte Spur Track itself and the Baldhead Road, it suffices to say, in summary, that,

- The Charlotte Spur Track section was the most expensive section of the Mount Baldhead Road

- The road was constructed as a consequence almost completely of the politicking activities of Bairnsdale traders who imagined that it would allow them to obtain a substantial part of the trade with the mining fields between Bairnsdale and Omeo and beyond which was almost completely by-passing them.

- The prior and prerequisite section of the road, from Bairnsdale through Bullumwaal to Mount Baldhead, was constructed by the Bairnsdale authorities with public funds originally allocated for a Waterworks Scheme.

CHARLOTTE SPUR TRACK
1978



CHARLOTTE SPUR TRACK
1978

Although the funds were substantial, they were not sufficient even so to provide a road of reasonable all-weather quality and finally the road was to be a cause of acute financial embarrassment to the Bairnsdale municipal authorities.

- Faced with the fait accompli provided by Bairnsdale, the Government were influenced to fund completion of the Baldhead Road through to Omeo, even though the Inspector-General of Public Works considered it to be a wasteful use of resources and likely only to produce a fair summer road.

- The road traversed country subject to extremes of weather conditions, which ensured that on many occasions each year it was impassable as a consequence of heavy snowfalls or, alternatively, quagmires of mud to the depth of cart axles.

- As a through trade route the road was an absolute failure, merchants and traders finding the route from the port of Mossiface on the Tambo and north via the Tambo Valley to still be preferable.

- Work on the Bairnsdale end of the Baldhead Road was commenced in 1892, by which time the much vaunted tinfields of Mount Wills had proven a failure, and was complete through to Cassilis by 1900. Its total cost approximated £14,000 or, in today's value of money, over $0.5 million.

- The Charlotte Spur Track section of the Baldhead Road was completed at the close of 1898 to the design of George Seymour, the Omeo Shire Engineer, and at a cost of £825 or, in today's money, about $33,000.

- The Charlotte Spur Track section of the Baldhead Road was one of the few useful sections of the road, since it provided a rapid all-weather access from the Brookville (Sheepstation) goldfield to the trading infrastructure of Tongio West, Cassilis and Omeo.

- Although Bairnsdale continued after 1900 to press the Government for funds to upgrade the poorly constructed sections of the southern end of the Baldhead Road, the Director-General was adamant that the show was over, a sentiment supported by the Shire of Omeo who, from 1900, gave almost no further attention to the road.

- By 1912, one of the few signs of activity on the road was that of a man employed on a minimal annual retainer to cut trees off the route.

It might well be assessed that the Mount Baldhead Road as a whole was a, if not the, classic white elephant of road construction in Victoria, built upon completely unfounded premises, incapable of providing for all year round traffic and most serious of all, diverting substantial and scarce financial resources from developments of real consequence. A cautionery tale if every there was one.

Physical

The Charlotte Spur Track provides an example of the best in side-cut mountain road construction with its considerable lengths of dry bedded rock-faced retaining walls made from the granites, metasediments, sandstones, schists and basic dykes through which it passes.

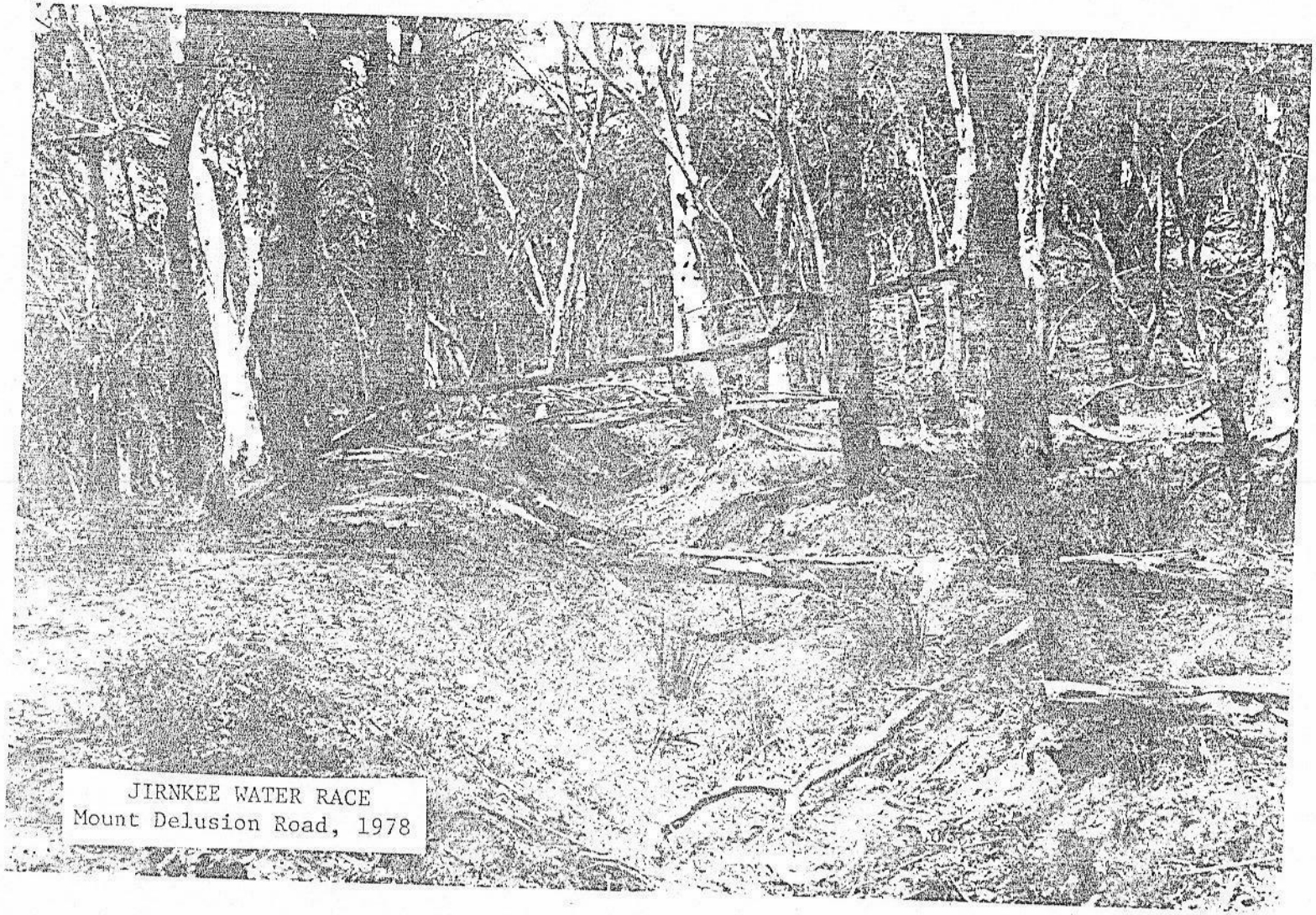
Although there are elsewhere in Victoria a number of similarly constructed roads, there are few of such extent and quality of construction and few so readily accessible to the passing visitor or tourist.

The retaining walls are generally in good condition considering their age and lack of regular maintenance. They should continue to remain in good condition providing that, all tree and shrub growth on the edge of the track adjacent to the retaining walls is removed, any drainage erosion hazards are removed and the walls are not subject to vandalism.

The track surface is generally good, reasonably even and provides adequate traction except in isolated spots where the track may cross weathered dyke, other clay producing features or simply zones of forest loams.

2.2 The Jirnkee Water Race

The Jirnkee water race is the longest privately constructed water race in Victoria, having a total surveyed length of race reserve, including both branches at its headwater sources, of 56 miles 38 chains which includes 1 mile 37 chains of pipeline at the delivery end at Tongio West.



JIRNKEE WATER RACE
Mount Delusion Road, 1978

Originally the race had a water entitlement of 12 million gallons per day, but in practice was believed to have a maximum capacity of 8 million gallons per day.

Historical

Working of the alluvial gold deposits in Long Gully along Grays Creek and also along Swifts Creek and its tributaries had since their discovery around 1851 been severely hampered by seasonal water shortages.

Even so, by 1890 some 75,000 ounces of gold are estimated to have been obtained from the alluvial deposits along Grays Creek, Swifts Creek and in the area generally.

Between 1890 and 1896 the alluvial in Long Gully was tested extensively and more systematically perhaps than had previously been the case, with the result that what were seen as potentially huge reserves of payable wash, were felt to exist and be ready for exploitation.

In that year of 1896, the matter of a race from the Wentworth River, designed to provide all year round water supply, was first investigated.

The background to the Jirnkee, its operations and that of other operations both prior and subsequently, is reviewed at some length elsewhere in this report. Here, in respect of the Jirnkee itself, it suffices to say, in summary, that,

- In 1896, a race from the head of the Wentworth River was proposed and was estimated to require a twenty-six mile length and to cost £2,000

- By 1899, when a company with substantial resources had been incorporated in London to work the alluvials of Long Gully and parts of Swifts Creek and construct a water race to provide consistent water supply, the estimated length of the race from the Wentworth was forty-six miles and the estimated cost was £4,000

- By 1900, the race was complete but was forty-eight miles long and the cost of construction had come out at £14,000

- The supply of water from the completed race failed to achieve anywhere near to the expectations of consistency and even after 1903 when additional length was added, the race achieved adequate capacity for hydraulicking for substantially less than half time.

- Apart from the inadequacy of the water supply and the almost crippling burden of the huge over-expenditure on race construction, the Company had invested in unsuitable plant which required radical change and which even then was fundamentally the wrong treatment form for the deposit.

- At its foundation, the company had anticipated treating 500,000 cubic yards of ground per year, for a return per year of 25,000 ounces of gold. In fact, when it closed down in 1905 after five years of operational tribulation, the Company had treated only 118,000 cubic yards, for a total return of 756 ounces of gold.

  During its career, the operational costs were about twice its income, and its nett loss on the venture as a whole, is estimated to be around £40,000 or, in today's value of money, say $1.6 million.

  The sum of the Company's losses, incidentally, would have been approximately enough at the time to construct three Mount Baldhead Roads.

- After winding up, an unsuccessful syndicate used the water race and later, from 1918 to 1923, the race was used to supplement the water supply for the Tongio Dredge.

Water races were, and in their now abandoned and overgrown state still are, a reasonably common sight around the Victorian goldfields. For example, in the late 1880's, there were in excess of one hundred and twenty Water-right Licences in force in the goldfields, almost all of which provided for a water race. Only its length makes the Jirnkee Water Race physically outstanding.

Although on account of its length, the Jirnkee may be considered as pre-eminent amongst privately constructed water races in the Victorian goldfields, it unfortunately also rates with its associated plant as a corporate disaster of considerable magnitude.

Not only did the race fail to provide the desired all year round water supply, which indicates an inadequate investigation of headwater flow potential, but the plant to which it was required to provide a constant water supply was inappropriate and inadequate to the task of treating the alluviums of Long Gully.

With interest, one cogitates upon the question of the potential value of these still undeveloped alluvial deposits in Long Gully.

Physical

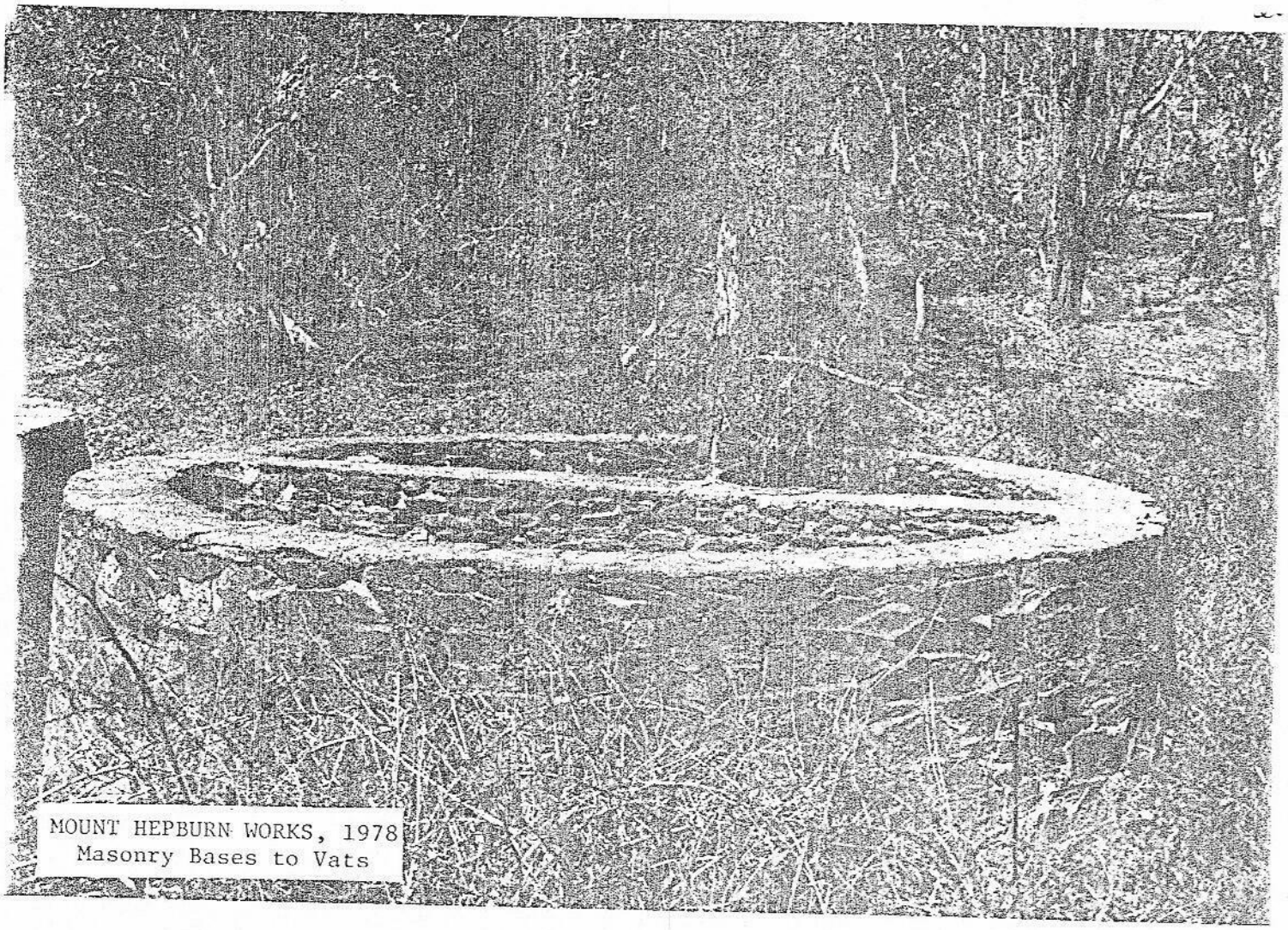
The race remains visible to this day over its full course. In the Cassilis area, it is most readily seen where it crosses the Great Dividing Range on the Cassilis (Poynton's) Gap - Mount Delusion Road.

Generally, the race no longer retains its original crisp outline, being now partially filled by silt and rotting forest debris and obstructed in the forested areas by fallen trees and tree limbs. The banks and invert have a covering of native and exotic grasses, native reeds, heath and other small plants.

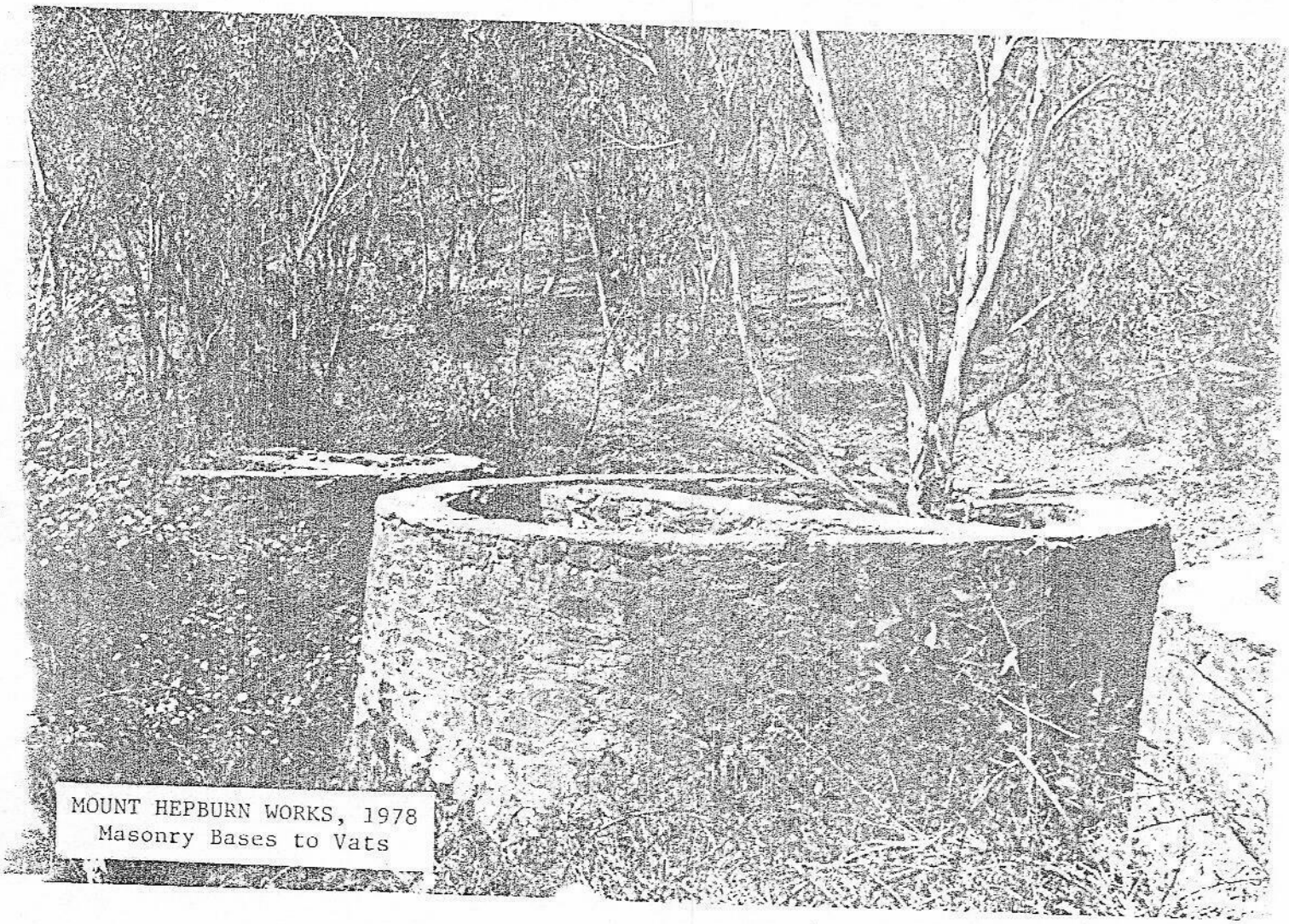
Apart from the obstruction by fallen trees and tree limbs, the patrol path on the downhill wall or bank of the race still provides an easy footway.

2.3 The Mount Hepburn Treatment Works

Interesting relics and constructions of yesteryear related to a great variety of ore reduction and treatment methods are to be seen at the site of the Mount Hepburn - King Cassilis Treatment Works at Tongio West, in addition to the existing contemporary mill and furnace of the present leaseholder.



MOUNT HEPBURN WORKS, 1978
Masonry Bases to Vats



MOUNT HEPBURN WORKS, 1978
Masonry Bases to Vats

It is doubtful if such a varied layout and assembly of basic remains related to complex ore treatments can be seen on any other single site elsewhere in Victoria.

Historical

What have appeared to be potentially valuable auriferous sulphide lodes at the Mount Hepburn - King Cassilis mine complex, have attracted the attention and investment of a great number of parties over the years from the original discovery, in perhaps 1858, until the present time.

The metallurgy of the deposits resulted in varying methods of ore reduction and treatment being undertaken. These have included stamp battery crushing and straightforward table amalgamation, fine grinding by an early ball mill variation, together with amalgamation, stamp battery and cyanidation with and without furnace desulphurisation, fine grinding and cyanidation with and without a furnace, stamp battery and gravity concentration and finally milling and smelting.

Development of the mine complex and of the various treatment facilities are described in detail in the illustrated historical review and commentary provided later in this report.

It suffices here to say, in summary, that,

- Although the first reef at Mount Hepburn may well have been found in 1858, which may possibly be the site of the first auriferous reef discovery in Gippsland, the initial development of the mine took place during the shortlived Swifts Creek mining bubble of the mid and late-1860's.

- The major activities on the site took place between 1893 and 1906 as a consequence of the development of the Cassilis - Tongio West goldfield and its acceptance as a field for the investment of Melbourne and overseas money.

- Between 1868 and the 1950's, 14,500 tons of ore were mined from the Mount Hepburn/King Cassilis mine complex for a return of 8,000 ounces of gold, and of this, some 12,000 tons was treated on site for a return just in excess of 6,500 ounces.

- Including concentrates and tailings purchased from other mines throughout the region, and from as far distant as Sunnyside and Glen Wills, almost 17,400 tons have been treated on site for a return of almost 13,450 ounces of gold.

  In addition, small quantities of other products were produced and sold at times, principally arsenic and silver.

- In 1893, the first reduction plant was erected on site. Contrary to the then usual practice of installing a stamp battery, an Otis Crusher (ball mill) of Victorian manufacture was installed; one of the earliest ball mill installations in Victoria and a forerunner of many successful ball mill installations.

  This experiment in the use of a ball mill and fine grinding was quite reasonably successful considering its novelty, and certainly was significantly more efficient than the stamp battery on Mount Hepburn ore. It fine ground 5,000 tons of Mount Hepburn ore for recovery of 1,675 ounces of gold by simple mercury amalgamation.

- In 1896, a large but shortlived company was formed in London to operate the mine, the ball mill concept abandoned and a heavy duty, twenty-head stamp battery was installed, which proved to be less efficient than the earlier Otis mill. That battery which had crushed only 2,893 tons of ore for a return of 207 ounces of gold, was sold to the Cassilis Gold Mining Company in 1900 and remained in operation there until 1916.

  The Company installed also a large boiler and engine which was found redundant and not used, and constructed a 60 feet high brick chimney stack to provide draught and disperse the smoke from the unused boiler.

- In 1897, a straightforward trial size 25 ton per week cyanide plant, using the McArthur-Forrest process with precipitation by zinc shavings, was installed and operated successfully on relatively oxidised and non-refractory tailings from Mount Hepburn ore, producing 207 ounces of gold from 351 tons of tailings.

- In 1898, a larger cyanide plant, using the Siemens-Halske electrolytic precipitation method and having, in practice, a throughput of 180 tons per week, was installed. This plant treated about 8,000 tons of Mount Hepburn and other tailings, for a return of 3,200 ounces of gold.

  The plant which had cost £7,000 (or about $0.3 million in present money value terms) was intended to handle 600 tons or more per week, but the nature of the ore did not allow this to be achieved.

  It is the masonry wall vat foundations for this labour-efficient cyanide plant that we can now admire on site.

- 1900 saw the construction of a comprehensive custom treatment works, incorporating a large desulphurising roasting furnace and long ground flues connected to the 60 feet chimney, and reversion of a remnant part of the earlier cyanide plant to the zinc shavings precipitation method.

  Concentrates from as far away as Sunnyside and Glen Wills and tailings from the Cassilis area were purchased and treated at the works for recovery of gold, silver, arsenic and antimony and manufacture of sulphuric acid.

  The works treated about 2,500 tons of concentrates and tailings for a recovery of 5,000 ounces of gold, more or less.

- In the period 1904 to 1906, the custom treatment works were extended and modified by a lessee to incorporate the Victorian developed Merton Furnace which had received acclaim world wide, a Dodge rock breaker, a Niagra pulveriser and finally, and ironically, a Krupp ball mill very similar in concept to the earlier Otis mill.

During that period, the works treated 1,890 tons of Mount Hepburn mine ore for a return of 1,379 ounces of gold.

- 1930 and 1931 saw the installation of a small gravity concentration plant, consisting of a five-head battery, and two concentrating tables. This plant treated only 220 tons of ore for a return of 114 ounces of gold.

- Finally, as far as plant is concerned, the 1940's and 1950's saw the installation and operation by the present lease-holder of a small mill and blast furnace, the production from which the lease-holder says was of the order of 1,350 ounces of gold in copper mattes sold to a refinery.

- Recent metallurgical tests indicate that 94% of the gold and 80% of the silver in the Mount Hepburn ores would be likely to be recovered if a plant were installed to produce finely ground flotation concentrates, to two stage roast the concentrates and to treat that product by cyanidation.

  This result is similar to that suggested in 1931 and provides an idea of what could be the form of any future plant that might be constructed at Tongio West if adequate ore reserves were available.

Although the production from the Mount Hepburn/King Cassilis mine itself is by no measure large on a statewide, or even Omeo regional, basis, it was nonetheless the third largest gold producer in the Cassilis - Tongio West - Gum Forest - Brookville area, being exceeded only marginally by the Perseverance/Scots Perseverance Mine near Brookville (Sheepstation), but completely eclipsed by the nearby Cassilis Mine in Powers Gully.

The present day value of the gold produced from the Mount Hepburn/King Cassilis Mine has a value in excess of $1.2 million, of which almost $1.0 million applies to treatment on site.

However, the treatment works at the Mount Hepburn/King Cassilis were, because of the variety and complexity of operations undertaken, without peer in the Omeo or even Gippsland region and stand comparison, though not on size, with anything similar in Victoria.

About the only significant treatment processes not undertaken were chlorination and flotation (a process in its absolute infancy in the heyday of the Mount Hepburn Works).

Although again the actual production from the treatment works cannot be compared with the Cassilis, the Maude and Yellow Girl and other mines in the Omeo region, the present day value of its products is estimated to have the respectable value of $2.2 million, including the value pertaining to the gold product from the Mount Hepburn/ King Cassilis Mine.

Unfortunately however, the enterprises at the Mount Hepburn have been burdened with corporate incompetancies and wishful thinking on a grand scale.

The most significant of these was the formation, in England, of the Mount Hepburn Company Limited, with a capital of £200,000 (or in present value money terms about $8.0 million) of which only £50,000 was available initially for working capital, a great arrangement apparently for the promoters and vendors, but not so for the ordinary shareholders, who are said to have invested and lost some £180,000 (or say $7.2 million in present value money terms) on the enterprise.

The Mount Hepburn Company Limited was floated on the premise of huge ore reserves and simple metallurgy, neither of which were investigated properly at the time, and both of which were quickly found to be incorrect.

That and other bungles apart, we owe a debt to the far-sightedness and entrepreneurial or technical capabilities of Edward Ball, Robert Hamilton, George Kermode, the Allsop Brothers, Donald Clark, and others, in respect of the various treatment constructions developed by them at the Mount Hepburn/ King Cassilis site.

Physical

The Mount Hepburn/King Cassilis Works site provides us with the interesting relics and construction remainders associated with a great variety of ore reduction and treatment methods. It is doubtful if such a varied layout and assembly of basic remains related to complex ore treatment can be seen on any single site elsewhere in Victoria.

It is possible to recognise throughout the treatment works site, the foundations of specific works and their layout and relationship one to another.

The most impressive constructions remaining on site are the masonry foundation walls constructed out of local schist, and designed to support the vats etc., of the cyanide plant.

These walls are fine examples of the stonemason trade and remain in surprisingly good condition considering the lack of maintenance over the last seventy years. They should continue to remain in good condition providing that all tree, scrub and other potentially damaging growth is removed and vandalism is prevented.

Other foundations etc., also exist but in varying stages of disrepair and little work would be required to prevent further deterioration.

The track into the works is narrow and fairly difficult for the unskilled to navigate. The track surface is, in part, very poor, slippery and potentially dangerous.

The Mount Hepburn water race from Swifts Creek above its junction with Powers Creek remains obvious but is overgrown and silted up in part, and obstructed by fallen tree limbs and tree and shrub growth.

Other Considerations

Both the mine and the treatment works sites are covered by mining leases that run for a number of years yet and may well even be further extended in time.

After all, the Mount Hepburn/King Cassilis complex may well be further explored and come to be again developed as a mine with it necessary associated beneficiation works.

Mr. John D. Avery, the present lease-holder of the property, has indicated that he considers the masonry walls in particular are worthy of preservation, but he makes the following comments, namely :

- That if visitors were encouraged to visit the site, then there is an increased risk of vandalism to his own plant and property and he, very reasonably, is not prepared to carry that risk or insure against it.

- That he would not discourage visitors if the risk of vandalism was carried by another party, and if a ranger or caretaker was appointed and visitors were prevented from approaching close to his plant, and from approaching or entering the mine workings and open stopes.

2.4 The Oriental Claims

The extensive alluvial sluicing workings known as the Oriental Claims are situated on a public reserve beside the Alpine Road to Mount Hotham and the High Plains, only a little over two kilometres south of Omeo town centre.

The name Oriental Claims is derived from one of the groups that worked ground there, the Oriental Sluicing Company, the shareholders of which were all of European extraction. However, individual Chinese co-operative mining groups working other ground did account for approximately half of the production from all workings on the reserve.

Working at the Oriental Claims commenced in 1856, and continued uninterrupted except for stoppages due to water shortages, until 1904, when the Sludge Abatement Board stopped the discharge of waste into Livingstone Creek. Minor operations to the requirements of the Board were undertaken later without success.

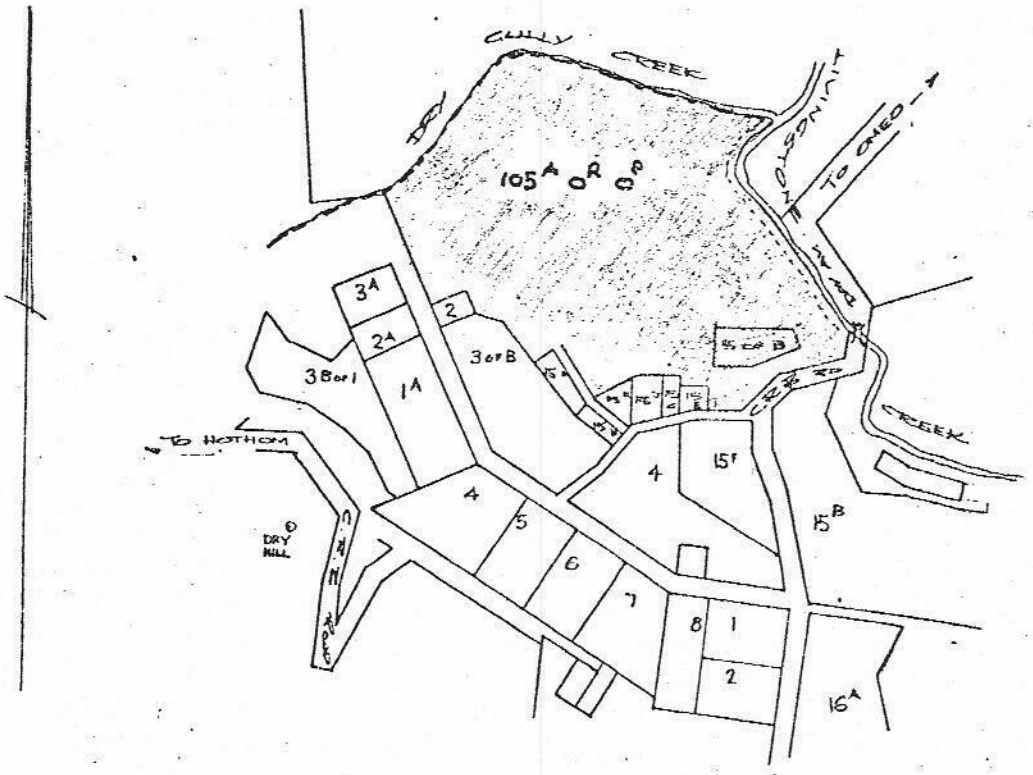
Historical

Although what are now somewhat loosely called the Oriental Claims are not exceptional in terms of output on a Victorian-wide scale, they are exceptional on the same scale in terms of gold content or grade, and were without doubt the largest and most profitable sluicing venture in Gippsland.

The deposits, which are over one hundred feet thick in parts, apparently occupy the bed of an ancient tarn or mountain lake, and are auriferous for almost the complete depth, more so at the levels of so called false bottoms which consist of layers of white gravelly wash somewhat free of large boulders.

SHIRE OF OMEO

SCALE 1" = 100 CHAINS.



ORIENTAL CLAIMS. OMEO.

PARISH OF OMEO — COUNTY OF BENAMBRA

DRAWING No 72/30

SHEET No 1 of 1.

DATE 28-11-72

for SHIRE ENGINEER

T. PETERSEN.

It has been suggested that the gold in the deposit is derived from the denudation of the top levels of auriferous quartz lodes found to the west of Livingstone Creek of which the Polar Star and Gambetta Reefs, in the vicinity of Powers Gully in the Dry Gully area, are examples.

An undeveloped deep lead is believed, by some, to exist to the south of the Oriental Claims.

The background to, and the development of, the workings at the Oriental Claims Reserve are described in detail in the illustrated historical review and commentary provided later in this report.

It suffices here to say, in summary, that,

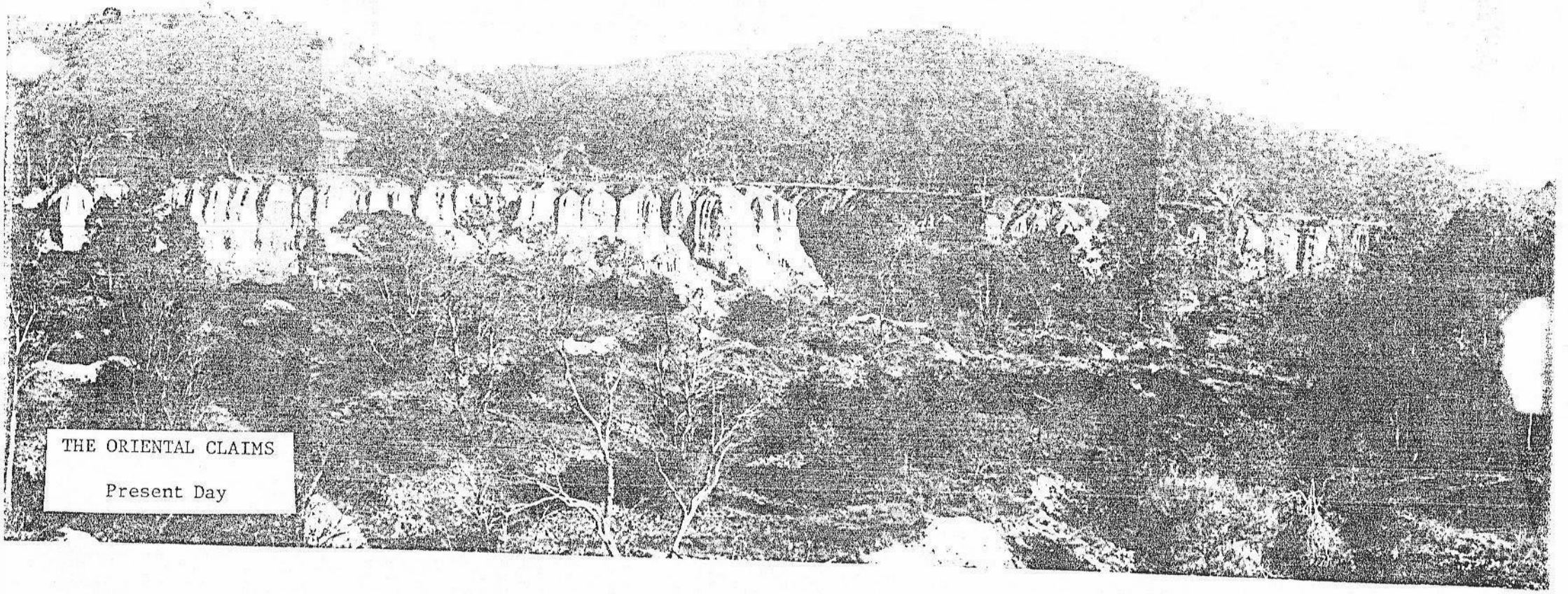
- The payable alluviums in Dry Gully Creek were first worked in 1856 and subsequently, in 1858, operations were commenced upon the northern portion of the Oriental Claims Reserve terraces by the Pioneer Claimholders.

- In 1873, the Pioneer Claimholders became the first in the Omeo area to use hydraulic hoses for breaking down the wash.

  The Pioneer Claim, sold in 1883, produced about 7,500 ounces of gold.

- From 1857 to about 1906, various individual co-operative parties, principally but not exclusively Chinese, produced about 22,000 ounces of gold, including the production by the purchasers of the old Pioneer Claim.

- In 1876, the Oriental Sluicing Company of five shareholders was formed as a working co-operative and continued to operate until shortly after 1904, with, as time passed, a changing shareholder composition and the need for substitutes and employed labour.


THE ORIENTAL CLAIMS
Present Day

The Company constructed a long and high level water race with a number of branches, but operation of this was delayed for ten years, until 1886, pending approval of a selector to allow it to pass through his property.

In 1889, they installed the first Giant hydrant and nozzle in the district, which provided a substantially increased rate of breaking down of the ground and increased production of gold.

During the course of its successful career, from 1876 to early 1905, the production of the Oriental Sluicing Company was 12,500 ounces of gold.

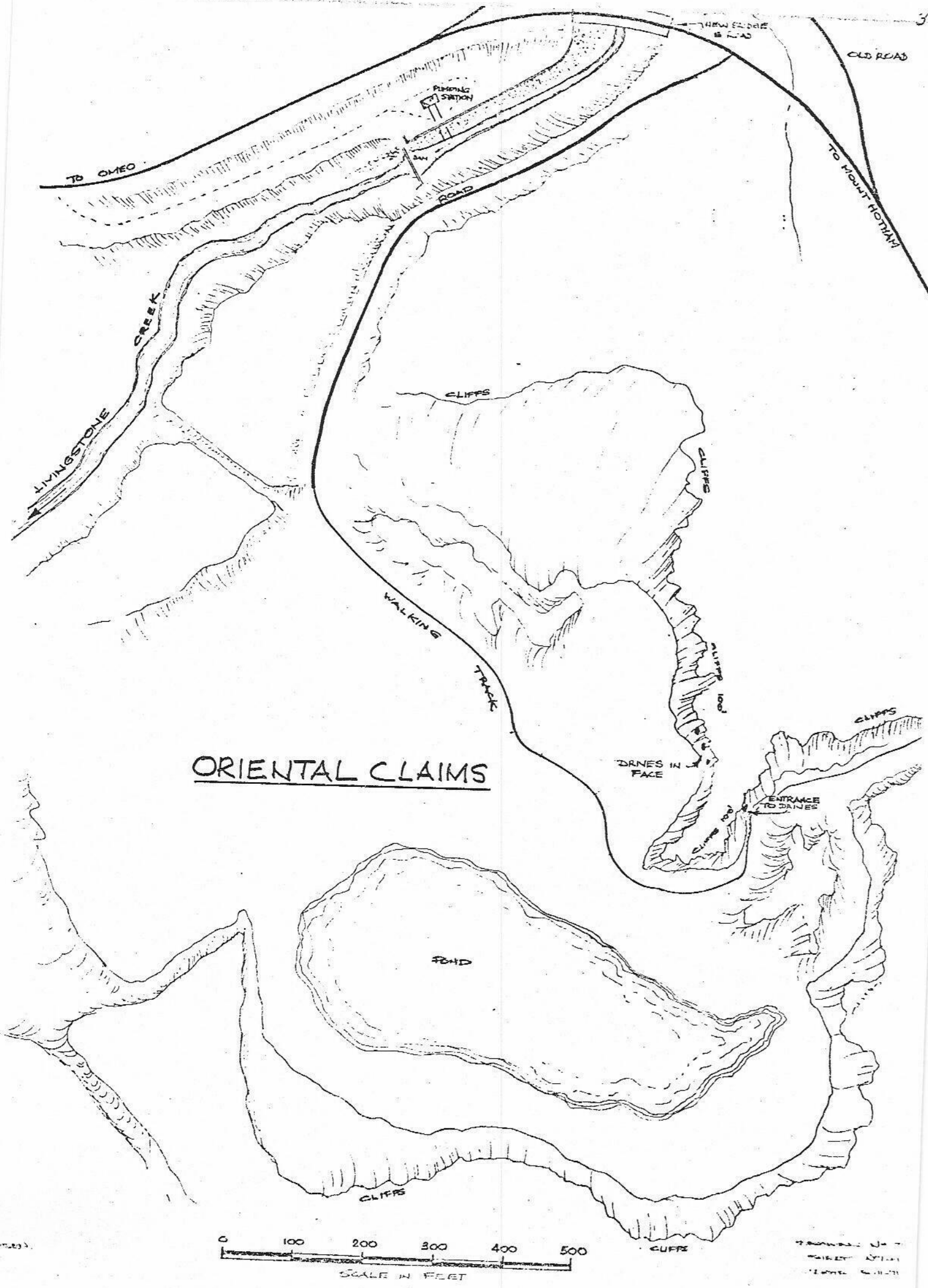
- Perhaps in the 1860's and certainly in the 1870's and 1880's, the ground to the south of the Oriental Claims Reserve was explored by shaft to depths greater than 200 feet in search of a deep lead.

Enough evidence of the presence of a lead, possibly of extremely large proportions, was provided to convince many people of its existence. However, because of financial restraints, it was not finally proven or delineated and has consequentially not been exploited.

- In 1904, the Sludge Abatement Board ordered all operators on the Oriental Claims Reserve to cease discharge of tailings and sludge into Livingstone Creek, an order that effectively stopped all treatment of consequence.

In 1911 and 1912, a company attempted to operate on the Claims using a scheme designed to meet the requirements of the Board, but its equipment was apparently inadequate and it closed down after producing only 54 ounces of gold. The site of this company's elevator can be recognised to the present day by the deep water-hole surrounded by rushes.

- Over the span of their operational lives, the total production of all operators on the Oriental Claims Reserve is estimated at 42,000 ounces of gold.


NEW ROAD
OLD ROAD
TO OMEO
PUMPING STATION
TO MOUNT HOTHAM
ROAD
CREEK
LIVINGSTONE
CLIFFS
CLIFFS
WALKING TRACK
ORIENTAL CLAIMS
DRIVES IN FACE
ENTRANCE TO DRIVES
CLIFFS
POND
CLIFFS
CLIFFS
0 100 200 300 400 500
SCALE IN FEET

Without difficulty, one can see the differing strata of deposition, including the false bottom beds of gravelly wash upon which, in various positions, early exploratory drives are exposed.

These faces and the chasms formed by man's activities, have produced a colourful landscape of considerable beauty and splendour. Tree and shrub growth throughout the Reserve and even within the worked areas is surprisingly prolific considering the apparent nature of the ground.

The position of the elevator used by the last operators is recognisable by what is now a pondage of pleasant aspect surrounded by rushes and other growth.

Also surprisingly, considering the fairly easy nature of the ground for ordinary and hydraulic sluicing, natural erosion of the majority of the faces is minimal and where this has occurred, it has, if anything, added to the attractive aspect of the faces.

Almost the only obvious cases of erosion that would ultimately be deleterious to any substantial degree, are some wash-away gullies that have come about as a consequence of constructing roading and car parking in recent times for the use of visitors. These provisions are not now in use, and whether they were or were not to be used in the future, the continuance of the erosion could be fairly simply prevented.

In general, the foot tracks throughout the old workings are in reasonably fair condition and suitable for the majority of visitors. The exceptions to this are in the southern end of the workings, where the foot tracks wind upwards to higher levels and are narrow and, in parts, very steep and have treacherous crossfalls.

Visitor traffic, which is almost completely pedestrian and which from appearances is only very occasionally of a trail-bike form, has had almost no deleterious effect upon track and other surfaces. Vandalism has been minimal.

It is clear that with only minor development work designed to assist the less agile, proper control and a regular, but inexpensive, maintenance programme, the Oriental Claims Reserve can be improved to suit visitor requirements and be maintained efficiently.

2.5 General Conclusion

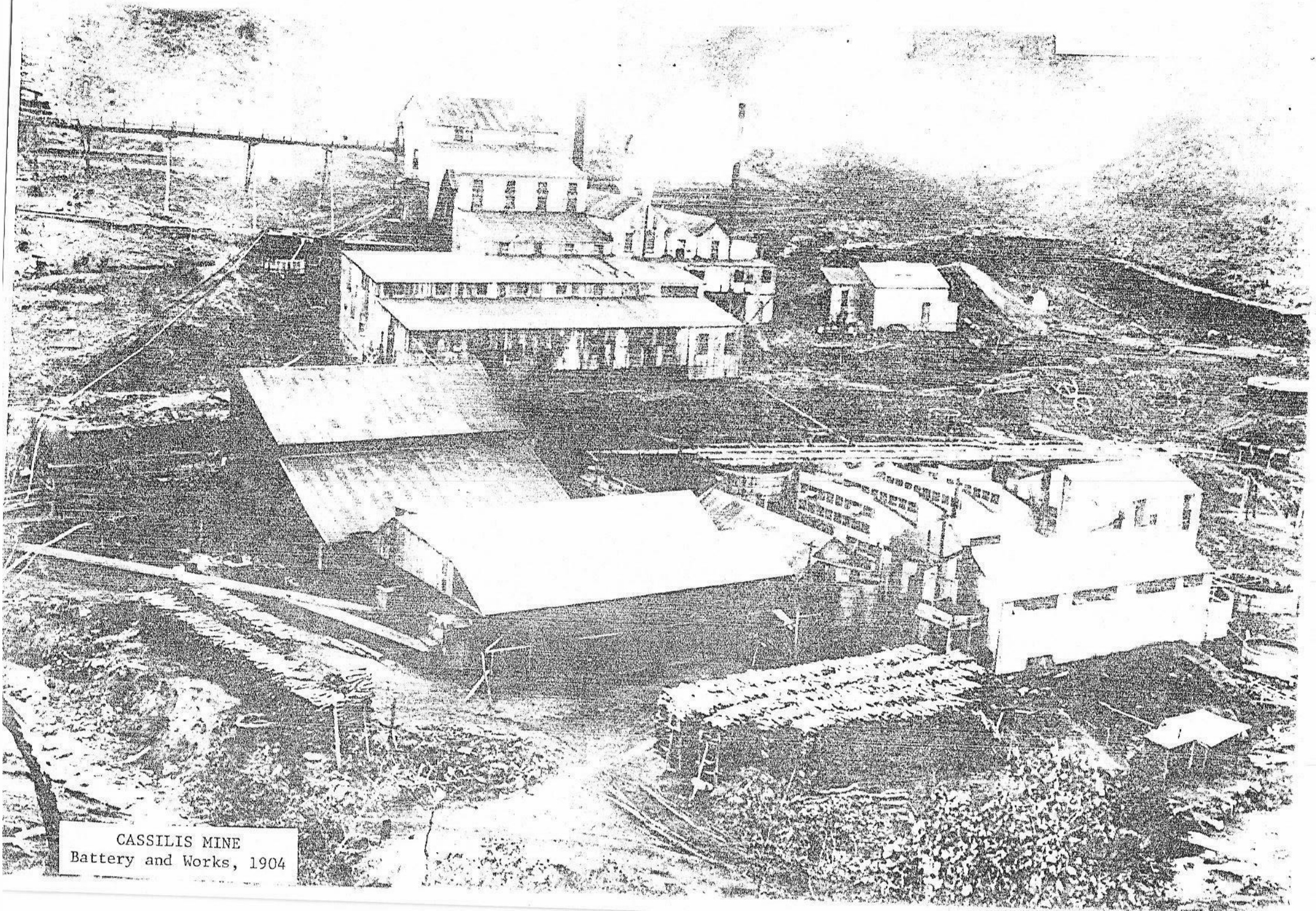
It is concluded that all four subject features or sites are significant, both historically and physically, in at least a Gippsland regional context.

In particular, the Oriental Claims and the Mount Hepburn Treatment Works had important impacts upon the social and economic growth of the Omeo regional community and provide excellent illustrations of the techniques employed in both alluvial workings and hard rock mining and treatment of complex ores.

However, it is noted that there are other mining sites, or there were other mining enterprises of significance in a regional context. Examples include the Cassilis, the Maude and Yellow Girl and various other mines at Sunnyside and Glen Wills, Markeys Line, the Ryan Brothers Brave George Battery, the Warden Works, early alluvial workings, dredges on the Livingstone, and others.

A number of these lastnoted are at least as significant as those being the subject of this report.

Although not the subject of this study now completed, it is also noted that there are a number of other sites, features and places not related to mining, which are or may be of at least equal regional significance. These include the Limestone Caves and a variety of other natural features, as well as sites, structures or buildings associated with the early pastoral pursuits of the region.



CASSILIS MINE
Battery and Works, 1904

3. RECOMMENDATIONS

3.1 Steering Committee

It is recommended that the Shire Sponsored Steering Committee be retained and that its membership be expanded in order to add to its expertise.

The Steering Committee would set priorities and plan, co-ordinate and implement activities related to the protection, preservation and restoration of historically significant sites, features and relics and also to the protection and preservation of physically significant sites and features.

The activities of the Steering Committee in respect of the Charlotte Spur Track, the Jirnkee Water Race and the Mount Hepburn Treatment Works are reasonably anticipated to continue at least until the management recommendations of the Land Conservation Council, noted in 1.5 earlier, are accepted and implemented by the Government.

It is particularly important that at least some members of the Steering Committee have specialist skills or interests, for example, mining and local history, finance, etc.

3.2 National Parks Service

As has been noted in 1.5 earlier, it is proposed by the Land Conservation Council that a substantial area south-west of Cassilis be permanently reserved as an Historic Zone and be managed by the National Parks Service.

Since the proposed zone embraces in full or part three of the sites or features which are the subject of this report, it is recommended that the Shire's Steering Committee immediately liaise with the National Parks Service in order to at least obtain from them some indication of their likely programme and future activities.

Although it may well be some time before the Service makes a positive and concrete contribution to the area, it is well that the Shire ensures or attempts to ensure that any of its actions are compatible with the likely actions of the Service.

Again, although a nominee could well be often absent it is desirable that a member of the Service be also a member of the Steering Committee in order that activities within the Cassilis Historic Zone be properly co-ordinated and implemented.

3.3 Forests Commission, Victoria

In many cases of significant sites or features in the region, the actions of the Forests Commission could well affect the site or feature.

A case in point would be the Charlotte Spur Track - Mount Baldhead Road and associated forest tracks and roads, almost completely situated within L.C.C. recommendation area A54, proposed to be managed by the Forests Commission.

Again, it is desirable that an Officer of the Commission be nominated to the Steering Committee in order that activities may be properly co-ordinated and implemented.

3.4 Other Public Authorities

For generally similar basic reasons to those in 3.2 and 3.3, liaison should be properly established between the Steering Committee and other Public Authorities who may have an influence upon Committees' activities.

These Authorities should include Conservation, Soil Conservation, Minerals and Energy and Tourism.

Where possible, appropriate Officers of the Authorities should be nominated to the Steering Committee.

3.5 Printed Information for Visitors

It is recommended that in the short-term an Omeo regional map be prepared for the benefit of visitors, somewhat in the form of that forming the front and endpapers to "Echoes from the Mountains", which was delineated by T.R. Petersen of Omeo.

This map could well approach the size of the B.P. roadmap of Victoria and cover an area from Mount Sassafras in the north to Tambo Crossing in the south and Mount Hotham in the west and the Cobberas in the east. It should be available for a suitable small sum, say twenty-five cents or so.

The map should identify all sites, places and features of physical and historic interest, of which the area has an abundance. With the scale as here envisaged, it would be desirable and possible to impose upon the map a number of small but clear illustrations of the more significant features.

On the reverse side of the map could be printed a thumbnail description of the various sites, places and features.

Such a map, well produced, would not only be useful to tourists but also would influence them to stay longer in the region.

It is further recommended that smaller maps be also produced of specific areas, for example, the Charlotte Spur - Brookville - Mount Delusion - Cassilis - Tongio West area. Such maps could illustrate the location of individual features in the area, for example, mine sites, battery sites, water-races, building sites, etc. etc.

One or two such area maps could be prepared in the short-term and others later, as acceptance levels are determined.

In some instances, feature survey plans of specific sites should be available for the visitor. For example, these could well be applicable to the Oriental Claims, the Mount Hepburn Treatment Works, the Cassilis works, etc.

The A4 size feature survey plan produced by the writer for the Long Tunnel Extended Mine at Walhalla contains a number of notes dealing with matters of historical interest, technical data, etc., and is provided gratis to the visitor. It is extremely popular at Walhalla and the majority of visitors appear to retain them as momentos of their visit.

In the medium term and judged by visitor interest and visitor numbers, a need may well be found to publish a small sixteen page or so illustrated booklet on semi-glossy paper describing succinctly the history of particularly interesting sites. From experience at Walhalla, such a booklet is purchased by about one adult visitor in every fifteen or twenty. At the present time the acceptable sale price of such a booklet appears to be fifty cents or a little more.

Researched historical reviews such as those included elsewhere in this report can be suitably edited and précised to prepare an illustrated booklet.

3.6 The Charlotte Spur Track

For location of the Charlotte Spur Track, see the Locality Plans contained in both Section 1 and this Section 3 of the report as well as in the historical review.

Specific recommendations in respect of the Charlotte Spur Track, in addition to those of 3.1 to 3.5, are that:

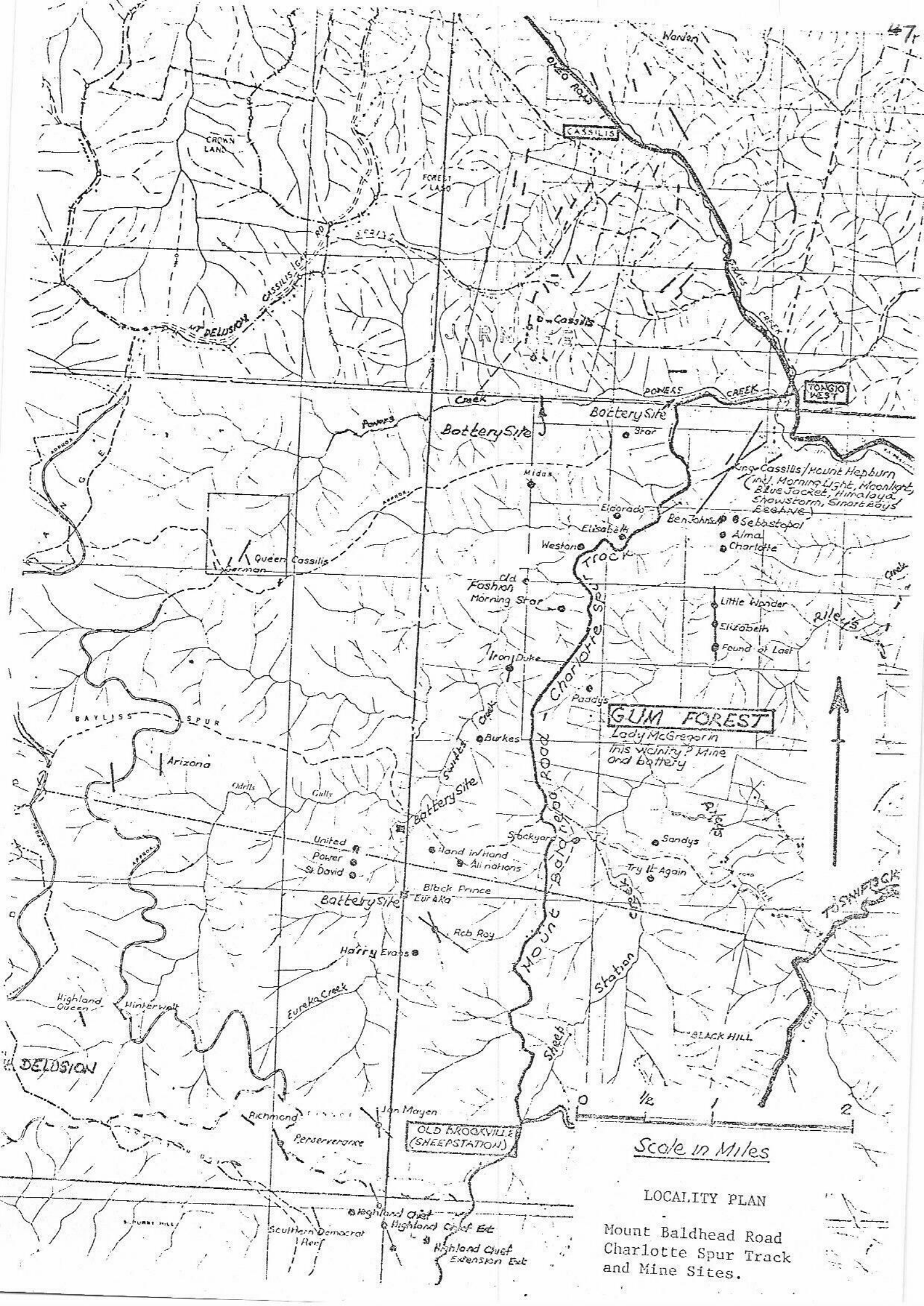
- All shrub and tree growth be removed in the short-term from the Track, where growing behind the retaining walls, i.e. between the walls and the carriageway, but grass and similar ground cover growth be encouraged immediately against the walls

- Drainage of the Track surface be improved and maintained in the short-term and beyond, particularly where stormwater is flowing parallel with the Track and causing erosion of the surface, and provision be made such that the water is taken across the Track by shallow surface drain and discharged on the outside of the Track clear of the ends of retaining walls

- The Track's carriageway be surfaced and maintained in the short-term and beyond with suitable gravel or crushed stone, where potholes, rock bars or significant bumps exist and where traction is poor

- The Charlotte Spur Track be promoted as a feature and as part of a tourist/visitor short trip route through the Gum Forest to Brookville (Sheepstation) and thence alternatively, to Swifts Creek Township via New Brookville or to Cassilis Gap via the Mount Delusion Track

Portions of the other tracks will require attention and modification to provide safe, fair weather, two wheel drive touring



LOCALITY PLAN

Mount Baldhead Road
Charlotte Spur Track
and Mine Sites.

- The Track, other tracks on the route or routes and all mining sites and features of interest be signposted

- Four notice-boards be erected at key entry and focal positions on the route, such notice boards showing a map of the route, features and sites of interest and a few brief notes as to history and the natural environment

  Locations for consideration are at the foot of the Charlotte Spur or at Tongio West, at old Brookville (Sheepstation), at Swifts Creek Township and at Cassilis Gap

It is considered that the responsibility for the first three items may well be substantially undertaken by the Forests Commission and that responsibility for the last three recommendations could be jointly that of the Shire, the Forests Commission and the National Parks Service in the short term, but in the longer term would be likely to be the responsibility of the Forests Commission and National Parks only.

3.7 The Jirnkee Water Race

For location of the Jirnkee Water Race see the Locality Plan contained in Section 1 of this report and the Lease Plan included in the historical review.

Specific recommendations in respect of the Jirnkee Water Race, in addition to those of 3.1 to 3.5, are that :

- Signposting to the Jirnkee Water Race be provided in the short term at Cassilis Gap, at the junction of the Swifts Creek - Cassilis - Omeo Road and the Mount Delusion Track

- Notice boards showing the extent of the race and a few brief notes as to its history be erected in the short term at Tongio West, at the junction of the main road and the track to Charlotte Spur and where the race crosses the Mount Delusion Track

- In the short term a short section of say 100 metres of the race and the patrol path where the race crosses the Mount Delusion Track, be cleared of forest debris and trimmed up to provide a surer foothold and crisper outline of the race, but that as far as possible existing growth of the grasses etc., be retained

- In the medium to longer term the matter of clearing the patrol path as a walking track from the Mount Delusion Track through to Cassilis be considered in the light of measurable tourist need

It is considered that the responsibility for the first three items could be jointly that of the Shire and the National Parks Service, but the responsibility for the fourth item would be solely that of the National Parks Service.

3.8 The Mount Hepburn Treatment Works

For location of the Mount Hepburn Treatment Works see the Locality Plans contained in both Section 1 and this Section 3 of the report, as well as in the historical review.

Specific recommendations in respect of the Mount Hepburn Treatment Works, in addition to those of 3.1 to 3.5, are that :

- In the short term an agreement as to both early access by the appropriate Public Authorities and the terms of any later promoted access by the public be negotiated with John D. Avery, the holding of the mining leases, under the entitlement of Her Majesty to use the ground for any public purpose

- In the short term all tree and other potentially deleterious natural growth be removed from the proximity of masonry walls and the like and all other debris, spoil and waste situated against, in between or around the masonry walls and the like be removed

It is the opinion of the consultant that the masonry walls and the like, being portion of the old plant are the absolute property of the Crown under Section 59 and other Sections of the Mines Act, 1958

- A feature survey of the site be carried out in the short term after the protective clearing operations are complete

- A short section of the Mount Hepburn water race adjacent to the Charlotte Spur Track and upstream from the junction of Swifts and Powers Creeks be cleared of natural growth and identified by a suitable signboard

- Upon suitable agreement with the lessee in respect of access by the public and protection of his property and interests being achieved, the entry to the track into the site be improved and the track itself be recut, formed and surfaced to a safe and readily trafficable condition

- Signposting be provided at Tongio West and at the track entry

- An information board be erected at the site of the treatment works

- The various objects of interest be identified and described succinctly on separate notice boards

- Toilet, ablution and other facilities be provided here or nearby for the use of visitors

- The appropriate arrangements as to protection of the lessee's property and interests be undertaken, which may include further notices, the employment of a ranger, erection of guard rails and fences etc., and must include provision for easy access by and for the operations of exploration and mining groups on site

It is considered that responsibility for the first four items could be jointly that of the Shire and the National Parks Service whilst the remainder should be solely that of the National Parks Service.

3.9 The Oriental Claims

For location of the Oriental Claims see the Locality Plan contained in Section 1 of this report and the two plans contained in Section 2.

Specific recommendations in respect of the Oriental Claims, in addition to those of 3.1, 3.4 and 3.5, are that :

- In the short term the footpaths in the main areas of the workings and up to the entrance to the accessible drive on false-bottom wash, be cleared of all boulders, loose rocks and other obstructions and where providing access upwards, be widened and regraded to remove hazards and be so maintained in the longer term

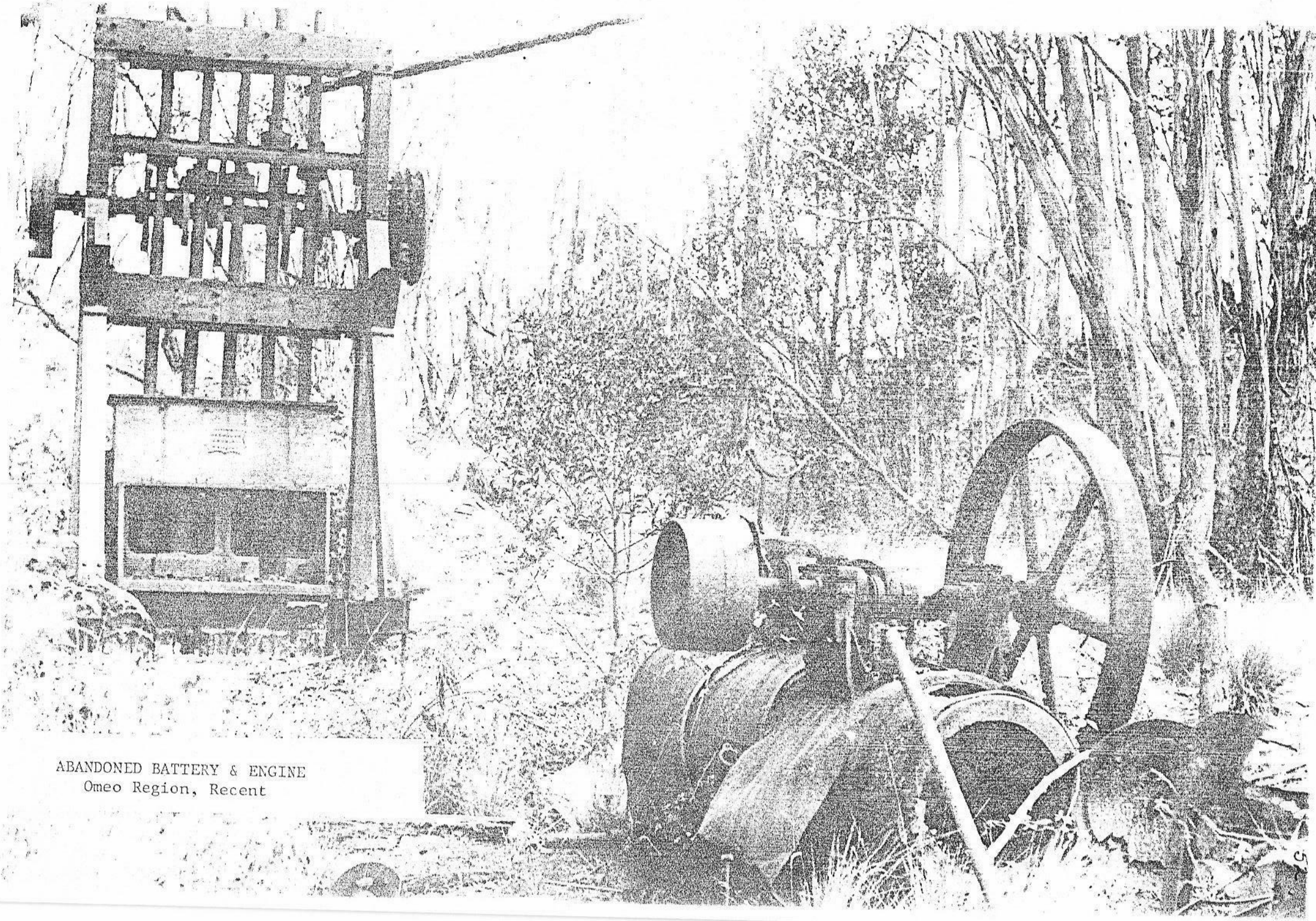
- An information board be erected in the short term showing a plan of the workings, features and sites of interest and a few brief notes as to history and the natural environment

- All features of interest be signposted in the short term

- The accessible drive on false-bottom wash be securely closed off in the short term by a robust steel gate some short distance in from its portal, the overhead portion of which portal should be carefully and regularly inspected for potential hazards and barred down as may from time to time appear necessary to the Shire Engineer or the Inspector of Mines and Quarries or any officers delegated with appropriate authority by the Minister of Minerals and Energy

- In the short term the drainage of and from the existing recent but now unused car access and car park be improved and further erosion prevented

- Negotiations be commenced with the Department of Minerals and Energy in the short term for permission to remove and keep on permanent loan at the Oriental Claims site, a suitable abandoned stamp battery with any associated plant, as that illustrated herein, and upon receipt of such approval construct appropriate historically correct foundation, remove and transport the equipment, after taking all required photographs for record purposes, and re-erect in safe condition on the Oriental Claims site as an example but not working exhibit of a public or private battery



ABANDONED BATTERY & ENGINE
Omeo Region, Recent

- Trail-bike activities be monitored and timely and appropriate actions be taken to control same

- In the short term, if not already gazetted, produce an up-to-date and appropriate set of regulations for management and control of the site and have same gazetted

- Suitable signposts be erected on the highway directing the visitor to the site

- In the short term, in association with the Country Roads Board, plan for construction in the medium term a suitable access for vehicles, since the present arrangement of parking across the highway near the Memorial Bridge puts visitors in danger when crossing the highway and in addition does not provide a suitable encouragement for the visitor to stop and enter the site

  or/

  Plan for improved car-parking across the highway and an adequate footpath access under the new bridge and into the site to be provided in the medium term

- In the medium term toilet, ablution and other facilities be provided for the use of visitors, but be so designed as to not interfere with the Omeo Water Supply facility

- In the medium term and with an adequate knowledge of visitor levels, a detailed programme be prepared to implement by stages a number of suggestions made by Peter Sanders in the Omeo Tourist Development Plan of 1973

- The local community be encouraged in the short term and beyond, to report the existence of any abandoned alluvial mining equipment in the region for collection and retention by the Shire or Committee of Management pending any future installation of such equipment on site and be encouraged to assist with restoration of such equipment

It is considered that the above items if carried out would almost completely be the responsibility of the Shire of Omeo, since little relates to the charter of other Public

Authorities. However, funding assistance should be available by way of subsidies from the Department of State Development, Decentralization and Tourism and, to a lesser degree, by way of grants from the National Estate Programme and other sources.

3.10 Other Sites and Features

It is recommended that consideration be given to investigating a selected number of other mining sites in the Omeo Region, since as is noted in 2.5 earlier, a number may well be at least as significant as those being the subject of this report.

Some suggested mining sites and enterprises are noted in sub-section 2.5.

Although not a subject of this study now completed, it is nevertheless recommended that consideration be given to investigating a selected number of sites, features and places not associated with mining since, as is also noted in Section 2.5, some are or may be of at least equal regional significance.

These could well include the Limestone Caves and a variety of other natural features, as well as sites, structures or buildings associated with the early pastoral pursuits of the region.

3.11 Register of the National Estate

If not already so done, it is recommended that the four sites or features which are the subject of this report plus a selected number of other sites, features or places which have not been examined in the study now completed, for example some of the mining sites noted in Section 2.5 and certain other sites, features or places not associated with mining, for example the Limestone Caves and certain structures or buildings associated with the early pastoral pursuits of the region, be nominated for inclusion on the Australian Heritage Commission's Register of the National Estate.

It should be noted that the present criteria for inclusion in funding allocations from the National Estate Programme, includes that the place, building or area is on the Register of the National Estate, has been nominated for it, or is likely to be considered for it.

3.12 Funding and Budgetary Cost Estimates

Budgetary estimates of cost for each of the recommendations made in Sub-Sections 3.5 to 3.10 inclusive, are scheduled overleaf.

The responsibilities for costs are seen as being proportioned in extent and as conditioned by timing, principally between the Shire of Omeo, the National Parks Service and the Forests Commission, Victoria. The Shire cost commitments are seen as being substantially funded by direct grants and subsidies, as later outlined.

The proportioning of costs has been established on the basis of the Land Conservation Council's Alpine Area Recommendations being implemented by the Government without unreasonable delay.

Consequently, substantial elements of cost are scheduled as the responsibility of the National Parks Service and the Forests Commission. In the short-term, however, recognition of practical constraints has determined that a number of those cost responsibilities be shared with the Shire of Omeo in order the expedite the activities.

Short-term is considered as one to two years and medium term is considered as two to four years.

The costs of normal administration and of normal duties carried out by Officers of the Shire and other Public Authorities have not been included in the estimates and similarly the administrative costs of the Steering Committee have also been excluded.

On the bases outlined above, the budget estimates of cost for all works total $140,100 of which $48,850 applies to the short-term and $91,250 applies to the medium term. It has been considered too premature to suggest either recommendations or budgetary forecasts for the longer term.

Ref.	Item	Budget Cost $		Responsibility for Cost			
				Short-Term $		Medium-Term $	
		Short-Term	Medium-Term	Shire	Others	Shire	Others
3.5	Regional Maps (20,000)	5,000	500*	5,000	-	500*	-
	Sub-Area Maps (20,000)	2,000	500*	2,000	-	500*	-
	Feat. Survey Plans (20,000)	-	2,000	-	-	2,000	-
	Booklets (8,000)	1,500***	3,500	1,500***	-	3,500	-
	Sub-Total	8,500	6,500	8,500	-	6,500	-
3.6	Shrub, Tree Growth	500	500	200	300	-	500
	Drainage	1,000	500	200	800	-	500
	Surface Track	1,000	1,000	200	800	-	1,000
	Tourist Trip Route	7,500	2,500	1,000	6,500	-	2,500
	Signposts	1,500	500	500	1,000	-	500
	Notice-Boards (4)	3,000	500	1,000	2,000	-	500
	Sub-Total	14,500	5,500	3,100	11,400	-	5,500
3.7	Signpost (1)	100	50	50	50	-	50
	Notice-Boards (2)	1,500	250	750	750	-	250
	100 Metre Section	1,000	500	500	500	-	500
	Walking Track (Long-Term)	-	-	-	-	-	-
	Sub-Total	2,600	800	1,300	1,300	-	800
3.8	Deleterious Growth	2,000	1,000	1,000	1,000	-	1,000
	Feature Survey	1,500	500	750	750	-	500
	Water Race	1,000	500	500	500	-	500
	Track	-	3,000	-	-	-	3,000
	Signposts	-	200	-	-	-	200
	Information Board	-	1,000	-	-	-	1,000
	Notice-Boards	-	2,500	-	-	-	2,500
	Toilets, etc.	-	15,000	-	-	-	15,000
	Protection (Excl. Ranger)	-	3,500	-	-	-	3,500
	Sub-Total	4,500	27,200	2,250	2,250	-	27,200
3.9	Footpaths	2,500	1,000	2,500	-	1,000	-
	Information Board	1,000	500	1,000	-	500	-
	Signposting	1,500	500	1,500	-	500	-
	Drive on Wash	1,000	500	1,000	-	500	-
	Car Park Erosion	1,000	1,000	1,000	-	1,000	-
	Highway Signposts	750	250	250	500	-	250
	Stamp Battery	-	5,000**	-	-	5,000	-
	Car Parking	-	15,000	-	-	12,000	3,000
	Toilets	-	15,000	-	-	15,000	-
	Abandoned Equipment	1,000	2,500	1,000	-	2,500	-
	Sub-Total	8,750	41,250	8,250	500	38,000	3,250
3.10	Studies:						
	- Other Mining (8)	7,500	7,500	3,750	3,750	3,750	3,750
	- Non Mining (6)	2,500	2,500	1,250	1,250	2,500	-
	Sub-Total	10,000	10,000	5,000	5,000	6,250	3,750

BUDGETARY COST ESTIMATES

Notes:
* Revisions, etc. only : Reprinting financed from Sales
** Based upon minimal use of voluntary labour
*** Writing-up, editing and mock-up completion

In respect of all recommendations, the Shire's cost responsibilities are estimated as :

- Short-term : $28,400
- Medium-term : $50,750

It is anticipated that the Shire could obtain grants and subsidies to fund a substantial proportion of the recommended actions. The principal sources of such funding are seen to be the National Estate Programme (administrated by the Ministry for Conservation) and the Department of State Development, Decentralization and Tourism (possibly upon a recommendation from the Treasury of Victoria).

On the basis of the Shire making appropriate submission and receiving reasonable grants and subsidies, it is suggested that the break-down of funding for their cost responsibility sectors could well be of the following form :

Short-Term

- Grants	$12,400
- Subsidies	10,650
- Omeo Local Contribution	5,350
	$28,400

Medium-Term

- Grants	$11,750
- Subsidies	26,000
- Omeo Local Contribution	13,000
	$50,750

Accepting that the above are only a fair guide, the Shire thus has to decide whether it is prepared to contribute around $5,350 in the short-term and $13,000 in the medium-term for preservation, restoration and other activities which could well influence visitors to remain longer in the region and thus increase the region's tourist income.

The consultant suggests that the implemention of the short and medium term recommendations could well increase the income from tourism in the Omeo region by $100,000 or more per annum in present value terms within four to five years.

3.13 Benefits

The principal benefits to accrue from carrying out the recommendations described earlier, are seen as :

- Providing and preserving for the enjoyment and use of present and future generations, mining sites, mining and mining related features of historic and physical significance, two of which, the Mount Hepburn and the Oriental Claims, contributed significantly to the economic and social advancement of the Omeo regional community.

  Apart from their obvious tourist potential, each of the four sites or features which are the subject of this report, stands as an authentic example of 19th and early 20th Century skills, techniques and enterprise and as such have considerable educational value

- Providing catalysts for continuing preservation of sites and features in the region

- Providing schemes which will strengthen and foster local community spirit

- Generating additional tourist revenue and job opportunity in the area

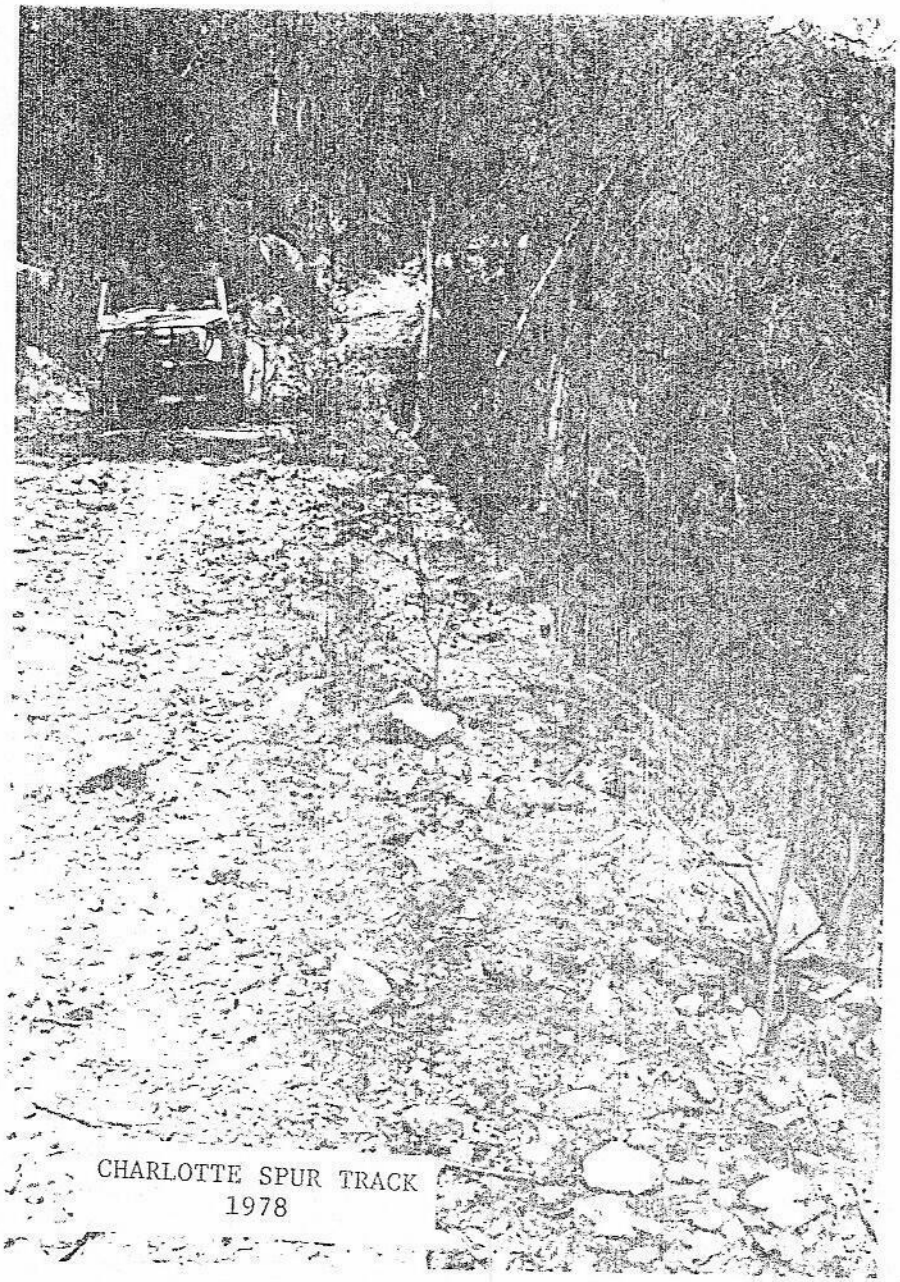
THE CHARLOTTE SPUR TRACK

An historical review and appreciation of the Mount Baldhead Route and the Charlotte Spur Track.

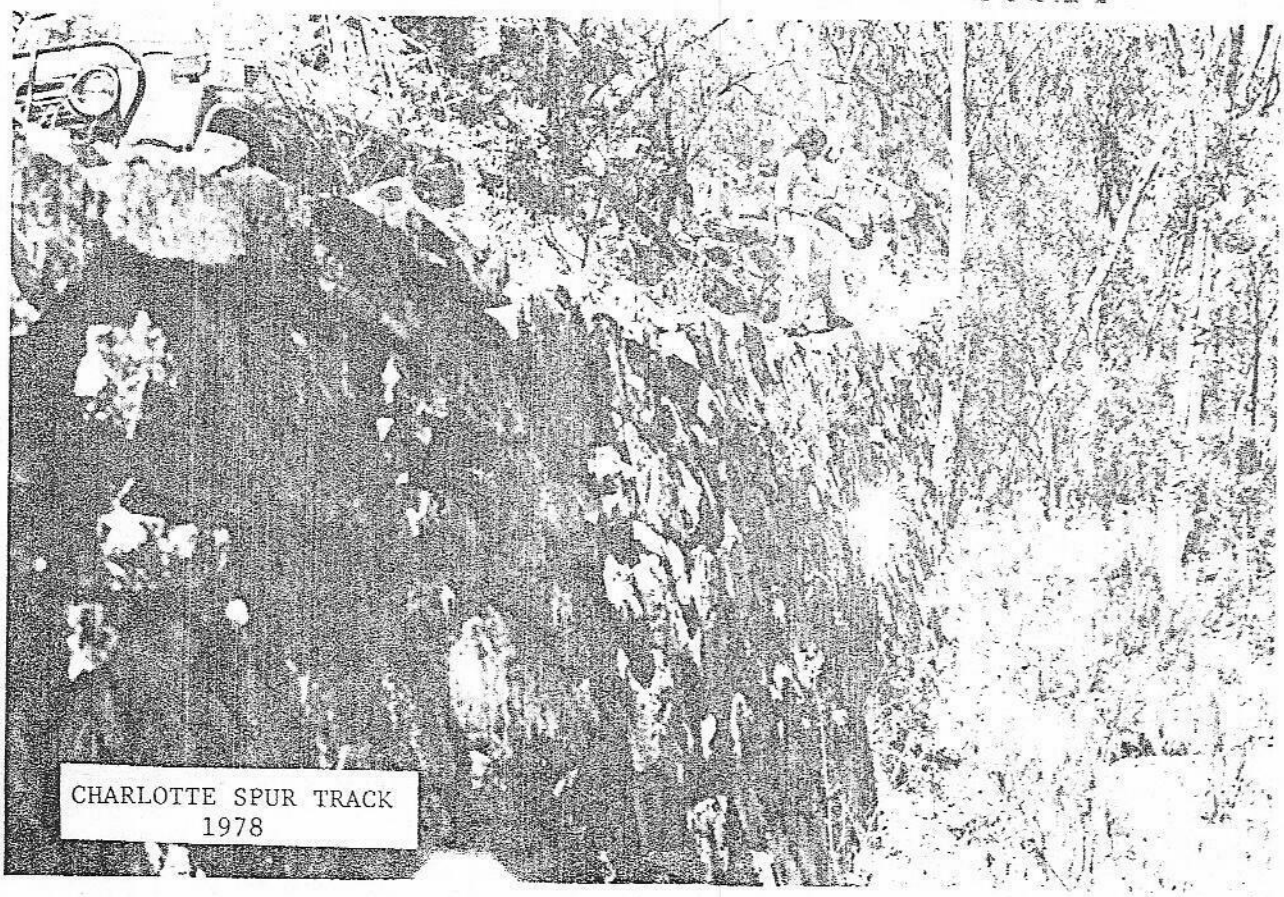
****

John B. Griffiths
Adexale Mining Co. Pty. Ltd.

As noted in 3.12, the consultant suggests that implementation of the short and medium term recommendations costed in 3.12 could well increase the income from tourism in the Omeo region by $100,000 or more per annum in present value terms, within four to five years.



CHARLOTTE SPUR TRACK
1978



CHARLOTTE SPUR TRACK
1978

INTRODUCTION

The early foot tracks, the bridle or pack tracks and the later dray track on Charlotte Spur as well as that road now known as the Charlotte Spur Track owe their presence variously to the need for access between and to the mining sites and centres in both the immediate vicinity of the Charlotte Spur and at much greater distances.

THE EARLY ALLUVIAL DIGGINGS

Unsubstantiated statements made many years later suggest that gold may have been found in the bed and banks of Swifts Creek or its tributaries as early as the finds at Livingstone Creek, Omeo during 1850 or 1851.

However, it was not until 1854, some two years after reports of gold in the Tambo River, that reliable contemporary sources report gold diggings being undertaken in Swifts Creek by twelve men working three alluvial claims.

The finds at Swifts Creek continued to be worked at intervals by various parties of miners during 1855, 1856 and 1857, the extent being increased in 1856 by workings opened up in Sheep Station Creek.

By January 1858, there were fifty miners sluicing ground in Swifts Creek, Sheep Station Creek and also in Rileys Creek, named after James Riley who was also one of the first on the Haunted Stream diggings.

A permanent camp or settlement developed in the period at the junction of Swifts Creek and Grays Creek, just upstream from Grays Marsh. This settlement subsequently became the township of Tongio West, the first partial survey of which was carried out by Assistant Surveyor, Thomas Cooper in 1865.

Newspaper reports of 1858 indicate that the miners on Swifts Creek and its tributaries were satisfied with their returns. Such a comment, when put together with other information, probably indicates a weekly return per miner of between one-half and three-quarters of an ounce of gold, an income then in the range of £1.15.0 to £2.12.6 per week, or in present day purchasing terms say, $75.00 to $115.00.

Satisfaction with the alluvial returns probably continued for the next six or seven years during which time, apart from the inevitable short period desertions to not too distant new finds, the miner population on the Swifts Creek field generally remained in the range forty to sixty.

It was during this period that the alluvial mining population in the Swifts Creek area changed its character from one of almost exclusively European origin, to one having a significant number and subsequently for some years a majority of Chinese miners.

Between the early months of 1864 and mid-year the mining population of the area nosedived from some forty-five miners exclusively working the alluvial deposits both in the Tambo and in Swifts Creek and its tributaries, to around twenty.

It is apparent from official reports that severe water shortages during a number of years subsequent to 1864 made the production of alluvial gold in the Swifts Creek more difficult and as a consequence general preference of both European and Chinese alluvial miners was to work elsewhere. In particular they preferred to work on the alluvial deposits at and nearby to Omeo, where, though far from perfect the water supply problem was not as extreme as at the Swifts Creek diggings.

In 1868 the water levels in the streams was so low that the Chinese miners in particular were able to operate in the actual bed of the Tambo River.

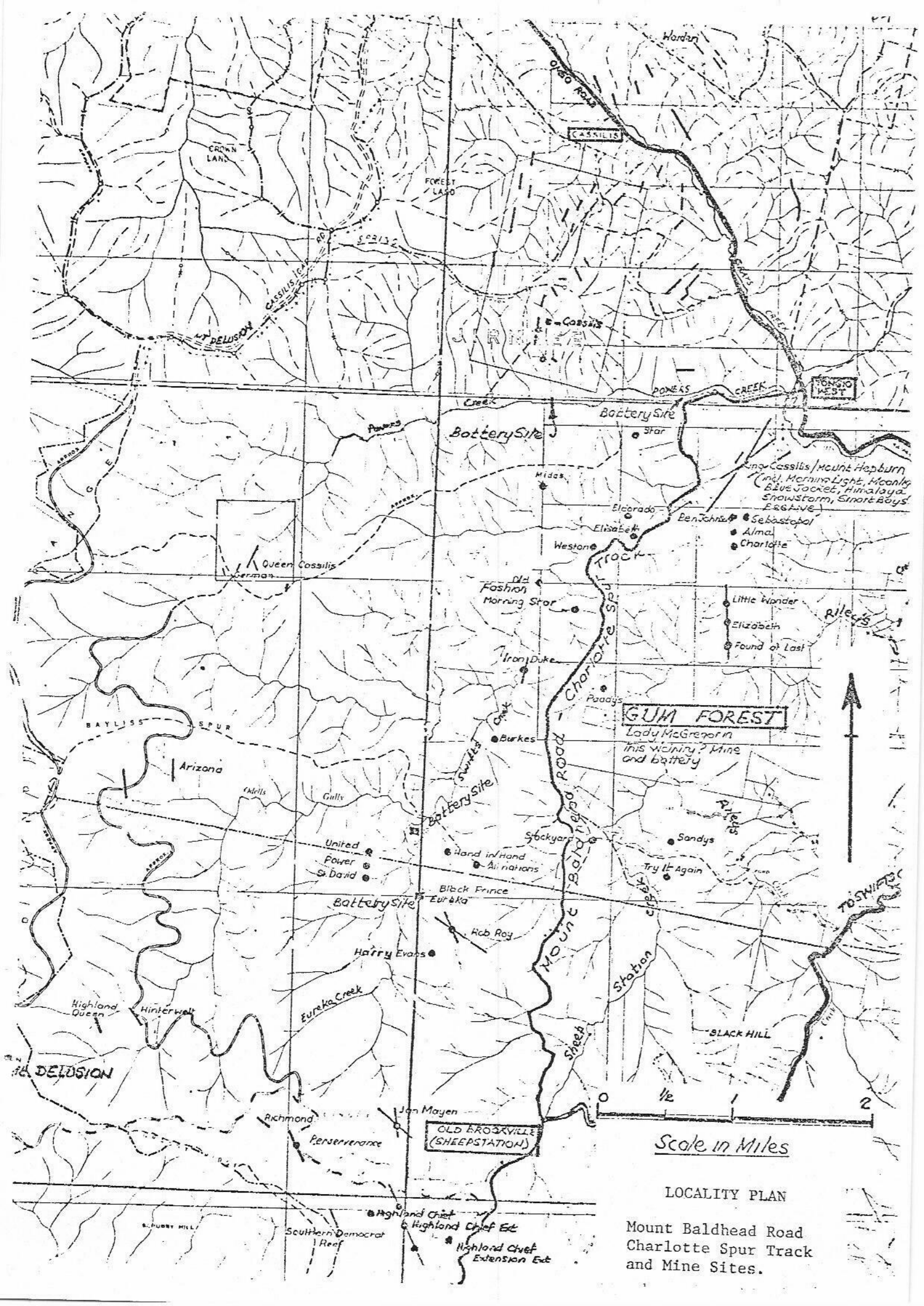
Even so, and in the face of adverse conditions, the alluvial mining population of the area rapidly grew again, rising to well over one hundred at times, principally because of the perseverance and the successful co-operative party techniques of the Chinese miners.

A return of any importance to mining of the alluvial beds by miners of European origin around Tongio West had to wait until the late 1890's and the first two decades of the twentieth Century, with the introduction of extremely long water races such as that of the Jirnkee Hydraulic Sluicing G.M. Company, and the equipment, pontoons or dredges of that and other companies including the Tongio Dredging Company.

In the years 1864 and 1865 the European miners around Tongio West turned their attention to the quartz reefs of the district, deposits which were found to be extensive in number and complex in nature and which to this time provide the mineral explorer with a number of unanswered questions as to their potential and value.

EARLY REEFING

Writing in 1886, James Stirling the Mining Registrar at Omeo at the time, who had formerly been the Lands Department Surveyor for the area and who subsequently was to become Victorian Government Geologist, reported that William Power claimed to have found the first gold bearing quartz reef in Gippsland, at Swifts Creek some twenty-eight years earlier.



LOCALITY PLAN

Mount Baldhead Road
Charlotte Spur Track
and Mine Sites.

That would place the first quartz reef discovery along Swifts Creek in the year 1858.

It would not surprise if Power's claim was correct. Assistant Surveyor Thomas Cooper plotted Power's hut or dwelling in 1865 as south of Swifts Creek near to the present day access track into the King Cassilis (Mount Hepburn) property and further the stream running westerly from the foot of the Charlotte Spur even then took his name, Powers Creek. Power would obviously have been well acquainted with the area. In 1868, the Swifts Creek correspondent of the "Gippsland Times" describes him as one of the earliest prospectors.

In October 1863, it was reported by William Phipps, the then Mining Registrar at Omeo, that a party of miners was prospecting for quartz at Swifts Creek and had found a gold bearing leader but not yet located the main reef. He was subsequently able to report that in the last quarter of 1864 a prospecting claim had been taken out at Swifts Creek, was known as the Star and that the discovery showed every prospect of being payable.

This development received fairly wide publicity in the press and was even included also in the 1865 edition of Bailliere's well known Victorian Gazetteer. The Star claimholders applied for a lease in early 1865 and as a consequence the first mining lease at Swifts Creek, Lease No.592 dated 12th April, 1866 and having an area of almost twenty-two acres was granted to W.C.Jack. The lease was to be operated under the name of the Star Quartz Mining Company and was situated on the spur located between Powers Creek and Swifts Creek.

William Charles Jack of the Star lease had interests also in the nearby Eldorado and Moonlight leases, was subsequently to be the proprietor of the Golden Age Hotel at Omeo and also joint holder of the Bundarah Run. Jack was elected a Councillor at the first election for the new Shire of Omeo, the first sitting being held in his hotel in February 1873, as were others for many years. He remained a Councillor until his retirement in August, 1877.

Currently with the Star activity a number of other leases were applied for and granted.

William Power together with T.W.Cooper, Zepherim Champagne, Daniel Egan and T.Easton were granted Lease No. 591, dated 28th May 1866 of an area a little over 24 acres, which was to be operated under the title of the Morning Light Quartz Mining Company. In position this approximates the location of what became known as the Beehive lease forming part of the ground held much later by the Mount Hepburn and the King Cassilis companies and further it was situated only some ten to fifteen chains south of Power's Hut or Dwelling. The number of this lease, 591, would indicate that application for it was made either immediately prior or at the same time as that for the Star.

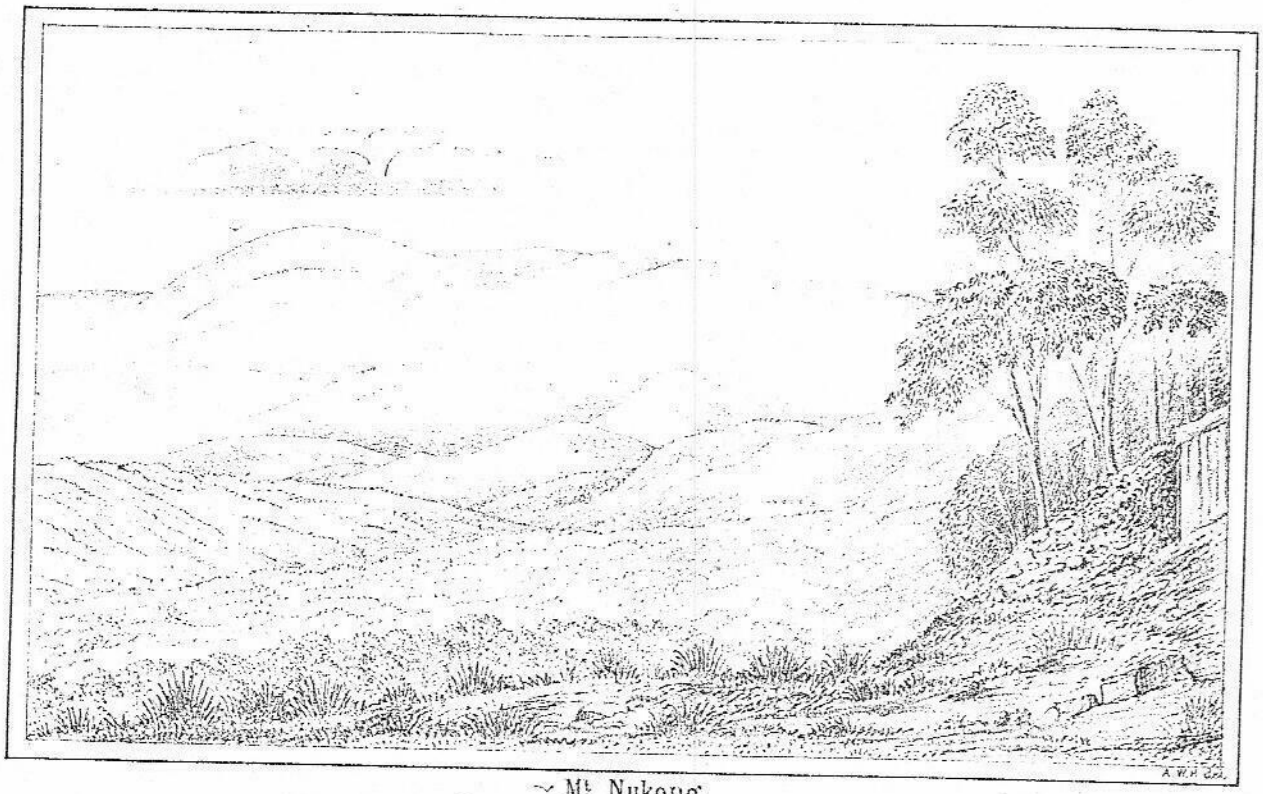
Also over and in the vicinity of the property to be later known as the Mount Hepburn and King Cassilis there were Lease 590 dated 14th May, 1866 known as the Himalaya and granted to John King, G.B. Hamilton and E.D. Fitzgerald, Lease 594 dated 23rd May 1866 known as the Moonlight and granted to T.Easton, T.W.Cooper, Ben Johnson, William C.Jack and Daniel Eagan, Lease 658 dated 28th May 1866 known as the Red Jacket and granted to John T. Reid, John T. Hodgson, Charles H. Hodgson, Ben Johnson and Robert T. Croft and Lease 927 dated 28th February 1867 known as the Rose & Lily granted to C.L.Vear and Others.

Interestingly, John King of the Himalaya was a member of Alfred Howitt's Gippsland Exploration Party, sent out in 1860 under a scheme funded by a government prospecting vote and instigated by Angus McMillan. Howitt together with King and other members of the party are credited with being the first discoverers of gold at Crooked River. King may well be the same John King who later kept an accommodation house on the Gibbo River and in 1885 prospected the upper reaches of Saltpetre Creek.

Dr. Alfred William Howitt, son of author and social commentator William Howitt of "Land, Labour & Gold" fame, was a well known explorer and scientist who held many positions of note in Victoria, including that of Police Magistrate and Warden of the Goldfields, Gippsland, based at Omeo from 1863 to 1866, and at Bairnsdale from 1866 to 1889, and that of Secretary for Mines from 1889 until 1895 when he was appointed to the position of Commissioner of Audit.

Howitt has many claims to fame in the annals of Australian history, the most widely known perhaps being his exceptional role as leader of the relief party sent out in 1861 in quest of the ill fated Burke and Wills expedition, the well known survivor of which was another John King. Howitt had by that time a well deserved reputation as an explorer, first of the country around Lake Eyre and latterly in Gippsland. In part, the routes of his early exploration in Gippsland, during which he and his party including John King of the Himalaya, found gold at Crooked River, the Dargo and Wentworth were perpetuated in Howitts Track, a name applied also to the route in part of what was to later become the well publicised Bairnsdale - Mt.Baldhead - Omeo Road of which the Charlotte Spur formed one section.

Discovery and the search for knowledge were driving forces in Howitt's career. Even before the discoveries in Gippsland, he and his father together with Bateman and Holberg are credited with the discovery of gold at Stanley. He devoted much of his time to the study of the geology of Gippsland, being the author of many papers and reports on the subject, including one publicised in 1880 dealing specifically with the geology and mineralisation of the Swifts Creek Reefs, occurrences which he had observed since 1863 at the time of their first publicised discovery. Howitt was a well known figure throughout the Alpine Region of Gippsland, often found in company with his wife on these travels and often to be seen executing his own sketches, he being a draftsman of no mean skill. As also an ethnologist of repute, his work "The Native Tribes of South-East Australia" would be his most well known publication on that subject.



~ Mt Nukong,
View from the Rob Roy Mine Eureka.

MOUNT NUKONG (NUGONG)
Drawing by A.W. Howitt, c 1875

The T.Easton of the Morning Light and the Moonlight leases is none other than Thomas Easton, well known Shire Secretary at Omeo from 1873 to 1903.

Thomas Easton had been a resident in the Omeo area from 1856, being variously shareholder, secretary,manager, working miner, consultant and entrepreneur of a number of mines, particularly on the Swifts Creek reefing field. As a working miner or mining manager he was employed on the Eureka, the most active of the Swifts Creek Reef Mines of the late 1860's. In the late 1860's and until his appointment as Shire Secretary he was employed as assistant to William Phipps, the Mining Registrar.

On 28th May, 1866, Thomas Easton as Manager registered a company known as the Morning Light, Moonlight and Blue Jacket Amalgamated Quartz Mining Company, of nominal capital £3,600 in 720 shares of £5 each, and a then paid up capital of £252. The shareholders were all those to whom the Morning Light (No.591), the Moonlight (No.594) and Blue Jacket (No.658) leases were granted plus in addition a Mr.A.G.Wengell, but curiously excluding the likely original discoverer William Power.

Power's absence from the Amalgamated Company may well be accounted for by a decision to sell out, as early in 1866 he had also been granted a Lease 628 on the Upper Dargo in the name of the Sunshine Gold Mining Company.

The ubiquitous William Power however, did not cut his ties with Swifts Creek permanently, for crushings of 56½ tons for a return of 41 ozs. 13 dwt. are recorded for a claim in his name during 1868 and 1869, after the old Moonlight Lease (591) had been voided for non-payment of lease fees in 1867. Power's claim then was situated between the United and the St.David on the west bank of Swifts Creek opposite its junction with Eureka Creek. He then turned up with a crushing at the Swifts Creek reefs in 1885 of 20½ tons for a gold return of 22 ounces.

To add perhaps further to the saga, it is said that as a consequence of a man named Power selling gold with quartz adhering to it, from his claim in Dry Gulley, Omeo, Sloan found a reef there which was to be developed as the Association mine said to be the first payable reef working in Dry Gully.

FIRST CHARLOTTE SPUR REEFING SHOWS

John Thomas ("Whisky Tom") Reid and his wife Charlotte had their home near the foot of what we now know as the Charlotte Spur. The popular story goes that Charlotte had one day climbed the ridge in search of attractive stones and whilst doing so, found gold bearing quartz on a site to be known as the Charlotte Reef.

What we can be sure of is that early in 1865, a lease over the Charlotte Reef discovery was applied for by Tom Reid and that subsequently Lease 620 dated 28th May, 1866, of an area of little over twenty-three acres was granted to John Thomas Reid of Swifts Creek, and Duncan McRae and Ben Johnson of Livingstone Creek (Omeo), to be operated under the title of the Charlotte Reef Quartz Mining Company.

On 16th September, 1865, Ben Johnson as Manager, had registered the Charlotte Reef Quartz Mining Company with a nominal capital of £5,000 in shares of £5 each, paid up at that date to two shillings, a then paid up capital of £100. Since half the shares, five hundred, were in the name of Tom Reid, it could well indicate that either Tom or Charlotte Reid were the discoverers. In any event, there is no good reason to doubt that the Charlotte Spur took its name from Charlotte Reid or from the Charlotte Reef named after her.

There is however, some question as to whether the Charlotte Reef was the first discovery on Charlotte Spur proper. Again in early 1865 another lease was applied for on the Spur, and as a result, Lease 593 dated 30th April, 1866, of an area approaching fourteen acres and situated adjacent and immediately north of the Charlotte Lease area, was granted to J.Day, J.S.Miller, and H.Roblin, to be operated under the title of the Alma Quartz Mining Company.

The Alma Lease number 593 indicates a lease application prior to that for the Charlotte, but it may well have been that the Charlotte Reef was explored under a mining claim prior to the Alma.

Mr. J. Day of the Alma was Joseph Day, who is credited as having been one of the discoverers of gold at Omeo.

On 1st June, 1866, Joseph Day as manager registered the Alma and Sebastopol Amalgamated Quartz Mining Company to work the Alma Reef and the adjacent Sebastopol. The nominal capital was £7000 in shares of £5 each, then paid to 6s.7½d. The shareholders were Joseph Day, George Whaley, John Smith Miller and William Haeffner, all of Omeo, and Henry Roblin of Swifts Creek.

Neither the Charlotte nor the Alma developed into profitable or permanent propositions.

The Charlotte Reef was worked to a depth of ten feet on a quartz vein six to eight inches wide and had one crushing of 30 tons for a gold return of 45 ozs.

The Charlotte Company made periodic calls of one shilling each on its one thousand shares but it is clear from the published accounts of February 1867 that it was struggling. At that time, there were unpaid liabilities in respect of wages, the salary of the manager who by then was Thomas Easton and trade accounts totalling in all £106.0s.1d., whilst cash available was only £13.9.2.; unpaid calls totalled £33.16.0.

The only actual mining enterprise of any consequence in these early years of the Swifts Creek reefing area was the Eureka, found in the Gum Forest shortly after the discovery of the Charlotte and Alma Reefs. It was situated near the southern end of the Gum Forest, on a spur to the east side of Swifts Creek and about 4¾ miles by pack track from the junction of Swifts and Powers Creeks.

In January 1867, the ever present Thomas Easton registered the Eureka Quartz Mining Company to work the reef. Its nominal capital was £2,000 in eight hundred shares of £2.10.0. each, and its then paid up capital was £200.

The Company had its first crushing of 50 tons at the custom mill at the foot of the Charlotte Spur in the last quarter of 1867, for a promising return of 79 ozs. 10 dwt. gold. Its last crushing was in the September quarter of 1869 by when 779 tons had been crushed for a return of 810 ozs.gold.

Its last crushing had included 200 tons of mullock and lower grade ore, the return from which barely covered the cost of packing and crushing. On a visit a few years later, Alfred Howitt commented indirectly upon this, noting upon his inspection of the workings that much poor stone had been needlessly taken out of the mine and a great deal of work and money expended uselessly.

Inefficiency was of course not confined to the Eureka; far from it. One can be sure that the excitement of what had appeared initially to be a promising new reefing district had infected everyone drawn into its association, emotion overruling reason. The number and rapidity of lease applications and the equally rapid voiding of them for non-compliance with conditions or non-payment of rental confirms this as also does the premature installation at considerable expense of an unnecessarily large battery.

Greed may well have had an influence on the way matters proceeded. Writing in 1894, "Forrester", a correspondent for the Omeo Telegraph in reflecting upon the early days on the Swifts Creek field, commented that "....needless to say the Charlotte Spur was a failure and by some called a swindle, anyhow I will leave it so..." Whether he spoke generally or specifically, is not clear. However, it was very many years before outside investors again showed much interest in the Swifts Creek region.

Since operations at the Eureka had apparently become clearly uneconomic by the end of 1869, and were likely to become even more so with the custom mill increasing its crushing charge in early 1870, the Eureka company abandoned its lease. In fact, at that time, all reefs at Swifts Creek were deserted and it was not until the early months of 1871, that any measurable work on quartz reefs was resumed.

The initial bubble on the Swifts Creek reefs had burst, and apart from a minor resurgence in 1872 and 1873, was not to recover for fifteen to twenty years. The mean quartz miner population of the field fluctuated between 1864 and 1876 broadly as follows:

1864	- 20	1871	- 5
1865	- 20	1872	- 25
1866	- 20	1873	- 25
1867	- 27	1874	- 15
1868	- 50	1875	- 14
1869	- 20	1876	- 11
1870	- NIL		

The ground around the Eureka Reef had been taken up by the Melbourne based, Black Prince Gold Mining & Crushing Company who had also purchased the custom mill. This company and their off-shoot, the Black Prince Extended had a short operational life, crushing about 1,225 tons in 1871 and 1872 from the Eureka and the nearby Black Prince and Renovator Reefs as well as from the old Himalaya lease area (then held under claim as the Snowstorn).

In 1873, the Black Prince Companies sold out to the Eureka Tunnelling and Quartz Crushing Company which again was an unsuccessful enterprise.

Late in 1874 is recorded the first crushing from the nearby Rob Roy claim held by Peter Forsyth. Generally from 1871, and apart from the short lived Black Prince and Eureka Tunnelling enterprises, and for many years to come the field was operated intermittently by small co-operative enterprises.

It was Peter Forsyth, operating his own battery from the mid - 1870's to crush ore from his Rob Roy claim and later from his Lady McGregor on the fall into Rileys Creek, as well as ore from the other shows in the area, that sustained the low key operations in the Gum Forest Charlotte Spur, Rileys Creek and Sheepstation Creek area for the next twenty years.

To the south, the Haunted Stream reefs were discovered by John Polich in 1882 and in 1885 the first reefs at Long Gully in the area around the later Casillis Township were discovered, possibly by Peter Forsyth's son, George.

To the west, reef was found at the heads of O'Dells Creek in 1888. In 1893, rich reefs were found in the heads of Sheepstation Creek, immediately south of Gum Forest and in the vicinity of the place then called Sheepstation and from 1895 called Brookville.

The Sheepstation or Brookville goldfield might well be said to have had its original roots in the Gum Forest enterprises nurtured for so long by Forsyth, and to have had its productive life from 1895 to 1918. Though its mines cannot be classed as large on a statewide basis,

two at least compare reasonably with the majority of mines developed in Eastern Gippsland.

- The Perseverance/Scots Perseverance:Apparently discovered by Bill Annand and operated by him and others as the Perseverance from 1898 to 1902 during which time it may have produced 2000 ozs. gold.
  Operated as the Scots Perseverance from 1902 to 1916 producing 6,587 ozs. gold from 14,640 tons of ore.

- The Highland Chief: Apparently discovered by George Forsyth in 1893, who in that year is believed to have crushed 36 tons for 154 ozs. The claim was sold to T.H. Dicken, who in 1895 crushed 38 tons for 489 ozs. of gold.
  Operated by the Highland Chief Company from 1897 to 1899 for a return of 1709 ozs. gold from 4316 tons of ore.

The Brookville Goldfield took its place in a chain or belt of mining centres flourishing to varying degrees in the 1890's and early 1900's and stretching from bear Bairnsdale in the south to Lightning Creek in the north. These centres included Bullumwaal, Deptford, Haunted Stream and Stirling, Brookville itself,Powers Creek the home of the Cassillis Mine, Tongio West, Long Gully and Cassillis Township, Nugong, Livingstone Creek, Dry Creek and the Omeo area, Glen Wills, Sunnyside, Wombat Creek and Mount Wills.

Such a belt of country was seen as an enticing trade route by the Bairnsdale folk who instigated the concept of the Bairnsdale - Mount Baldhead - Omeo road as a means by which they might have a direct access to the business they saw, or thought they saw to be generated along the belt.

THE BATTERIES

Consequent upon the euphoria surrounding the discovery and pegging of leases along the Swifts Creek, up the Charlotte Spur and into the Gum Forest a group of thirty-one Melbourne investors were prevailed upon to proceed with the establishment of a crushing plant at Swifts Creek. The site selected was at the foot of the Charlotte Spur close to the junction of Swifts and Powers Creeks.

On 20th June, 1866 these investors registered the Omeo Quartz Crushing and Mining Company, having a nominal capital of £3,000 in sixty shares of £50 each and the amount then paid up being £300. The initial arrangement was for the company to crush ore from six leases which most likely included the Star, Alma, Charlotte, Himalaya, and the Morning Light, Moonlight and Blue Jacket Amalgamated.

A fifteen head stamp battery, seventeen horsepower driving engine and cornish boiler were purchased in Clunes for despatch to the site but its delivery was delayed by the state of the entrance to the Gippsland Lakes,and its completion of erection on site prevented as a result of the inadequate financial state of the company.

At the company's meeting on 18th December 1866, Mr. Bancroft by then the legal Manager of the company, reported that the machinery, transport of same etc., had cost £2,622.12.2., the unpaid calls totalled £285.15.0, uncalled capital was £250.0.0., but that liabilities were then £1,048.8.5., a figure well in excess of available resources.

The Omeo Q.C.&M.Company was unable to proceed and Bancroft together with some of the shareholders formed a new company styled The Swifts Creek Crushing and Mining Company. This company was registered on 1st May, 1867, having a nominal capital of £2,220 in five hundred and fifty-five shares of £4 each, and a then paid up capital of £1,387.10.0.

Clearly the Swifts Creek Crushing and Mining Company purchased the whole of the Omeo Quartz Crushing and Mining Company's plant for no or little more than the liabilities of the failed company.

The new company purchased a few remaining items for the plant and had it completed by September, 1867.

It is understood that the battery was erected for the company by John Hayward and W.Johnston. Hayward was the part owner of the Cassillis station and of both a hotel and butchering business at Tongio West, whilst Johnston was the owner of the store there.

In October and November the company crushed a total of 198 tons from eight leases for a recovery of 154 ozs.14 dwt. gold. The returns from the ore of the Eldorado, Sebastopol, Star, Alma and Midas were very poor whilst those from Eureka, All Nations and Hand-in-Hand looked promising, being more than an ounce to the ton.

In a financial statement of January 1868, Bancroft valued the plant at £3,250.

Crushing continued intermittently until mid-1868, when a dispute broke out between the miners and the crushing company as to the charge for crushing. Terms more favourable to the miners were arranged, which from Thomas Easton's subsequent comment, and a report by William Phipps, is taken to be a reduction from £1 per ton to fifteen shillings per ton.

Crushing recommenced in the last quarter of 1868 but since there was little water available due to the severe drought being then experienced, it is doubtful if ore would have been crushed even without the dispute as to cost.

At the close of 1869, crushing at the mill of the Swifts Creek Crushing and Mining Company ceased. From its commencement of crushing operations in October 1867, it had crushed 1703 tons of ore for a return of 1670 ounces of free gold. The principal supplier had been the Eureka Company which provided in that time 779 tons of ore from which it obtained 810 ounces of free gold.

During that short period of operation from October 1867 to the end of 1869, the company had provided a valuable and useful service to the district, having crushed parcels of ore from thirty separate leases and claims.

As a consequence, however, it had proven that the great majority of the prospects discovered to that time were sub-economic or in a few cases close to worthless. The effect of that upon the crushing company was severe, in that there was very little ore to be provided to the mill, and to operate reasonably they found it necessary to increase the cost of treatment from fifteen shillings to thirty shillings per ton.

This charge was too great for the remaining mining parties to accept and as a result all reef mining in the district was brought to a standstill and by March 1870, all the reefs in the Gum Forest, on the Charlotte Spur and alongside the Swifts Creek, were deserted.

In 1870, the crushing company marked down its assets to £2,870 and in mid-1871 sold their plant to the newly formed Melbourne company, the Black Prince Gold Mining & Crushing Company, who had taken up ground formerly held by the Eureka Company and the Himalaya Company; that last ground then being known as the Snowstorm. The Black Prince Company added mineral recovery appliances to the mill and crushings recommenced early in the second half of 1871.

Until mid-1872, the plant at the foot of the Charlotte Spur was the only mill in the Omeo mining subdivision.

By September 1872, two small water powered batteries of three heads and five heads respectively had been erected in Gum Forest. The three head battery of the Iron Duke Company was sited on the east bank of Swifts Creek some forty chains downstream from the junction with O'Dells Creek, whilst the five head battery of the Independent Company was also on the east bank but about 20 chains upstream of the same junction.

Early in 1872, the Black Prince Company had formed a new off-shoot, the Black Prince Extended Company to hold and operate both the fifteen head plant at the foot of the Charlotte Spur and the claims at the Snowstorm and the nearby Montcalm. The new company continued to crush also and principally for its parent, the Black Prince Company, which was working the Eureka, Renovator, Eliza Kate, and Black Prince Reefs.

By September of the same year, the mill was closed, since the crushings from the not distant Snowstorm were poor and the packing cost of around £1 per ton to the mill from the parent company's workings made the operation uneconomic. It was proposed to move the mill to the vicinity of the Eureka Reef as soon as a lease was granted over that ground.

Under the management of its new owners the fifteen head plant had crushed 1311 tons for a return of 1272 ozs. of free gold, plus blanketings and pyrites saved.

In early 1873, the Black Prince companies sold out to the Eureka Tunnelling & Quartz Crushing Company, who completed the removal of the fifteen head mill to a site near their operation on the Eureka, Renovator and Black Prince reefs. Apart from some trial crushings late in the year the mill remained idle during 1873, recommencing in the first quarter of 1874 to crush from both its own company workings and for others, including in the last quarter of that year the first crushing from the Rob Roy Mine, owned and operated by Peter Forsyth.

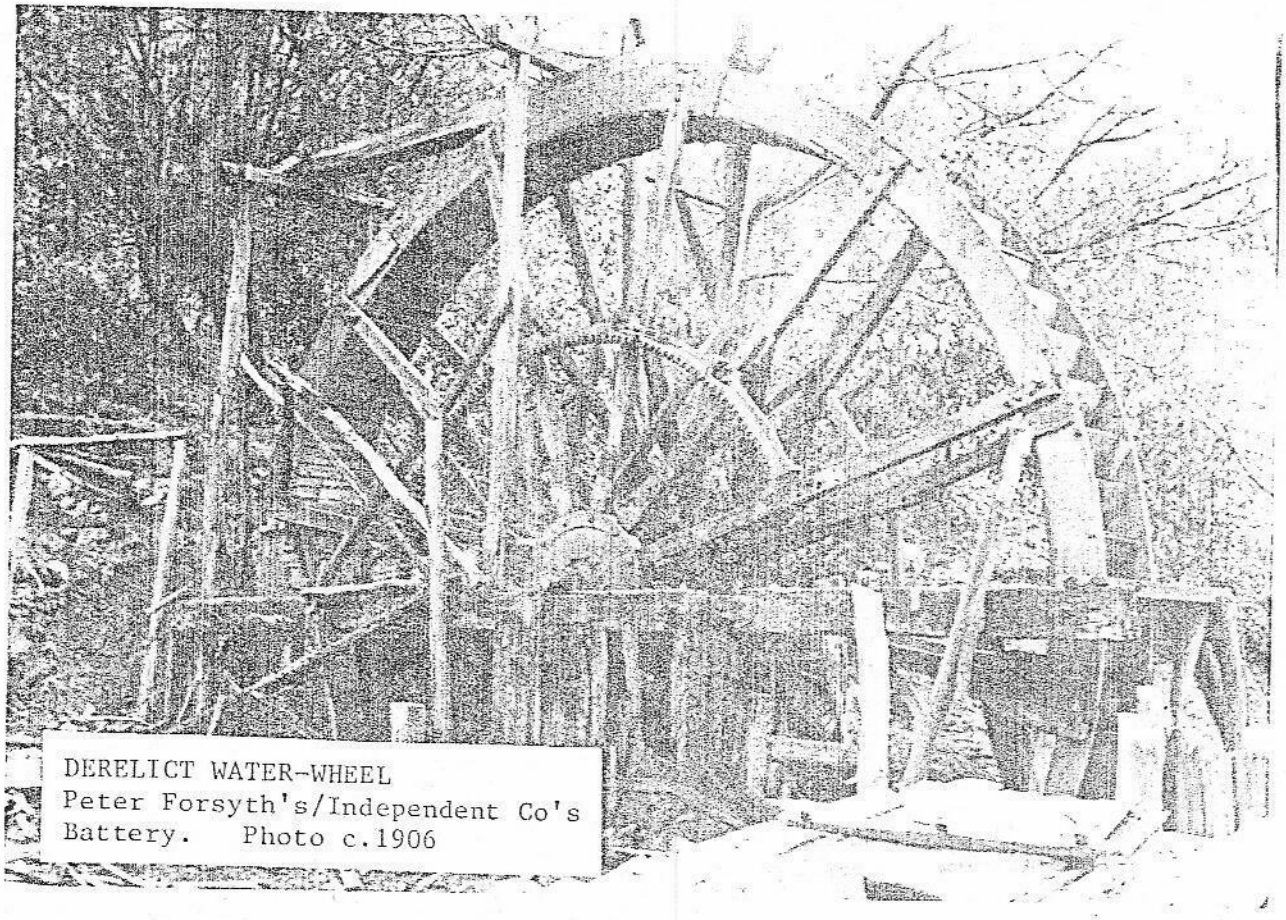
In 1875, the Eureka Tunnelling & Quartz Crushing Company gave up their mining enterprise, but continued to crush ore for others spasmodically until 1876, when the mill was sold to the Duke of Cornwall Company whose property was situated well outside the Gum Forest area, on the north side of Swifts Creek about four miles downstream from Tongio West. In 1883 the plant finally left Swifts Creek altogether, being purchased by the Federal Australian Company for erection on their property in Dry Gully, Omeo.

During the period 1874 to 1876 the fifteen head steam powered mill had crushed 695 tons of ore for a return of 620 ozs free gold plus blanketings and pyrites saved, and thus since its first operations at the foot of the Charlotte Spur until its removal to the Duke of Cornwall it had, by official government records, crushed some 3709 tons for a return of 3560 ozs. free gold plus blanketings and pyrites.

Making some allowance for officially unrecorded crushings, such as that from the Charlotte, it may be that its throughput was around 4000 tons for a return of say 3850 ozs. free gold.

One might well commiserate with the various shareholders who put funds into this mill. The capital investment provided over the period of its service to the Gum Forest, Charlotte Spur and Upper Swifts Creek reefs approximated £7,000, whilst its gross income over the whole period would have been little more than £4,000, its profit on operations negligible and the credit from its sale to the Duke of Cornwall was probably no more than £2,000.

By 1876 also the waterpowered three head battery of the shortlived Iron Duke Company had been removed and thus the only remaining mill in the area was the similarly powered five head battery of the Independent Company, which is taken to be the first mill owned and operated by Peter Forsyth.



DERELICT WATER-WHEEL
Peter Forsyth's/Independent Co's Battery. Photo c.1906

PETER FORSYTH'S LADY McGREGOR/
BALL'S GUM FOREST BATTERY (?)

Photo c.1906

Peter Forsyth's battery remained the sole mill in the Gum Forest and Upper Swifts Creek area for many years, in fact in the whole district after removal of the distant Duke of Cornwall plant in 1883. It crushed for his own developments at the Rob Roy, the Lady McGregor and elsewhere, and also for a considerable number of other small mining parties.

During 1882 and the first months of 1883 he replaced his old battery and waterwheel with new, at a cost of £700 and sited it at the Lady McGregor, and after two unfortunate breakages within the plant got into full production by the last quarter of 1883.

Late in 1884 he replaced or supplemented his waterwheel with an eight horsepower portable steam engine and in 1888 added two Watson and Denny Pans to assist with the treatment of tailings.

From 1885 when the first discoveries of importance were made at Long Gully in the district surrounding the now abandoned township of Cassilis, until 1889 when batteries were erected there by George Smart, The Rose of Australia Syndicate and the Never-Can-Tell Company, ore for trial and even for production crushings from Long Gully was carted by dray up to fifteen miles via Tongio West and the Charlotte Spur to Peter Forsyth's battery, which by then had become known by the name of his own principal property, the Lady McGregor.

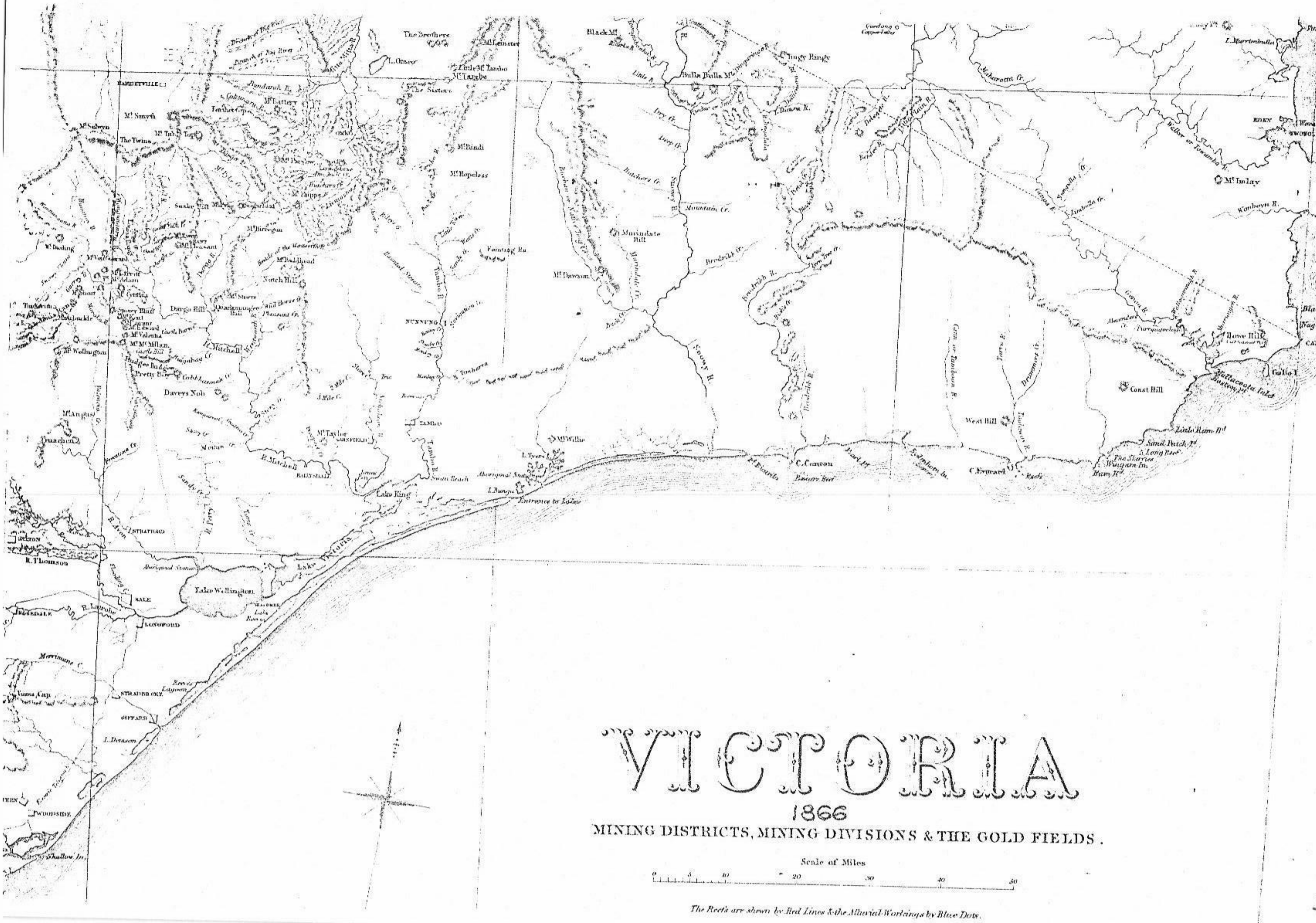
That of Peter Forsyth however remained the only mill in the vicinity of Gum Forest until late in 1895 when Johnston commenced crushing at his Sunbeam battery at Sheepstation (Brookville). After that a number of batteries were constructed around Brookville in the latter half of the 1890's including the Parnell, Commonwealth, Highland Chief and Jan Mayen.

In September 1896, Forsyth's battery was sold to Edward Ball who renamed it the Gum Forest Battery. Charges for crushing were, by steam power - nine shillings per ton, by water power - seven shillings per ton. A £5 surcharge was made for parcels under fourteen tons and a discount of one shilling per ton allowed on all parcels over fifty tons. Parties were to attend crushing and feed their own stone.

Forsyth's Lady McGregor mine and mill (Ball's Gum Forest Battery) was still in operation into the present century, being for example operated by John Avery of Cassilis who in the years 1906 and 1907 crushed 373 tons for a return of 191 ozs. gold. At that time the battery was still of five heads but Avery operated it with a Pelton wheel. John Avery was the father of John David Avery, the current holder of the mining leases covering the King Cassilis (Mount Hepburn) mine area at Tongio West.

THE TRACKS

Until the advent of quartz reefing there was no need for defined footsure tracks or paths over the Charlotte Spur, since alluvial miners travelled light and generally then along the creek beds.


VICTORIA
1866
MINING DISTRICTS, MINING DIVISIONS & THE GOLD FIELDS.
Scale of Miles
0 5 10 20 30 40 50
The Reefs are shown by Red Lines & the Alluvial Workings by Blue Dots.

The July 1864 map of the ranges prepared by George Thomas Jones, the surveyor to Angus McMillan's track cutting expedition, shows the track from Sale to Livingstone Creek via Tambo Village, the Tambo River Valley and Tongio Gap, but no track is shown around Notch Hill or Mount Baldhead, that country being labelled "Unknown".

In 1865, Assistant Surveyor, Thomas Cooper, though showing the location of both William Power's hut and a number of the earliest mining leases, does not illustrate any tracks.

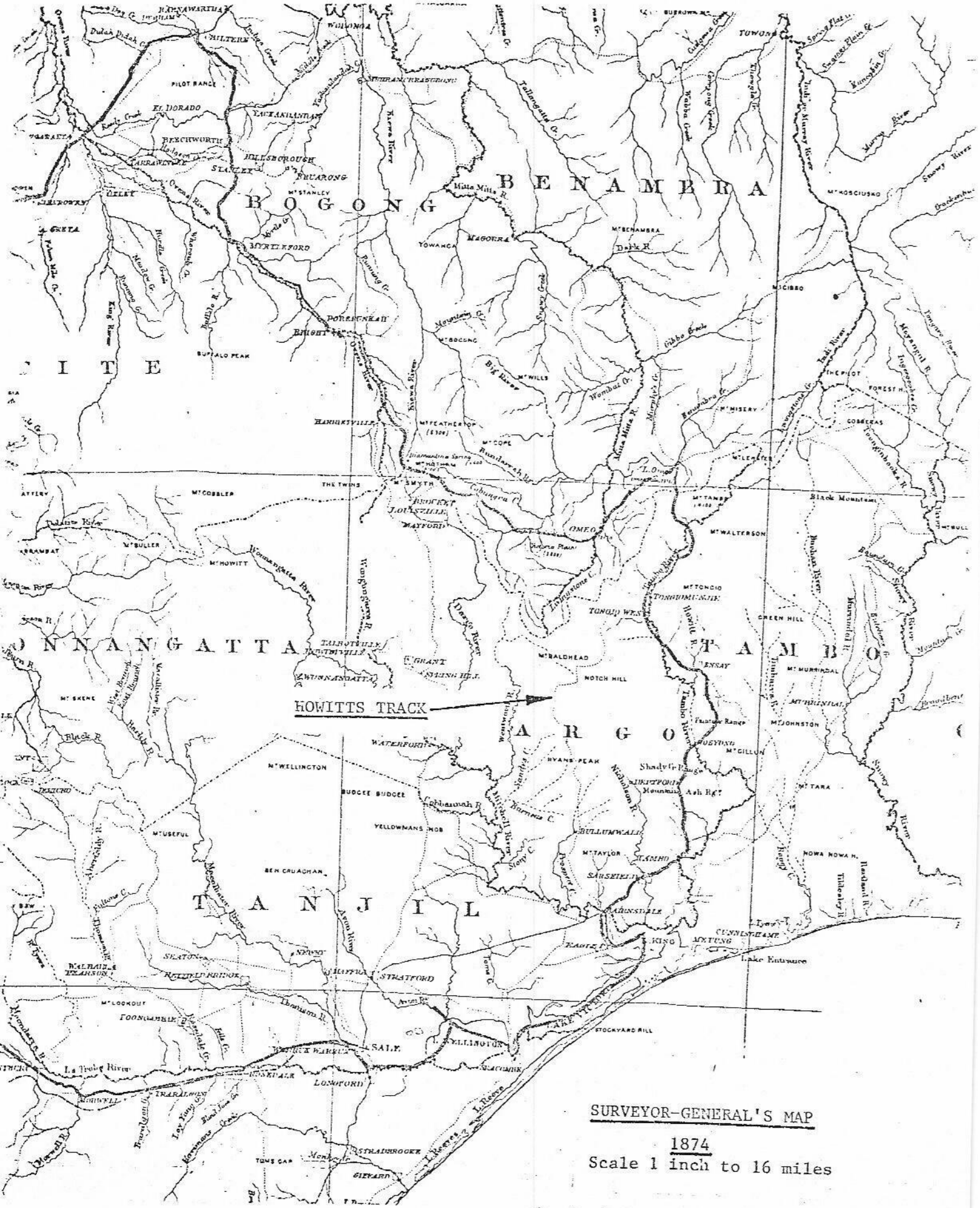
By early 1866 , a track is shown on the consolidated plan of leases prepared for the Office of Mines. This track is shown as passing down from the ridge between Rileys and Swifts Creek, that is from the Eureka and Black Prince reef area, through the Charlotte, Alma and Sebastopol leases and alongside the Ben Johnson, and then,by inference from a survey traverse line,to the bed of Swifts Creek about forty chains upstream from its junction with Powers Creek. It apparently then either crossed Swifts Creek to the Star lease or more likely followed the edge of the stream bed for the least forty chains to the creek junction.

The route on the Charlotte Spur until mid-1872 remained a bridle track suitable for packing ore by horse to the custom battery at the foot of the spur. In the latter half of 1872, the track must have been widened and improved to allow the transport of the battery by dray and waggon from its original site to its new location near the Eureka Reef high on the spur.

By the mid-1870's, Alfred Howitt illustrated on his geological sketch map of the Swifts Creek area that the track ran much as before except that it then no longer traversed the Sebastopol and Alma Reefs but dropped down to Swfits Creek directly from the Charlotte Reef. Howitt also illustrated a track from the heads of Sheep Station Creek across Sheep Station Gap and thence across the heads of Rileys Creek where just north of Black Hill it branched, one route to join the Charlotte Spur track near the Iron Duke and one other to join the same track further south at the Rob Roy, Black Prince and Eureka Reefs.

In 1874, the Surveyor-General's map of the Gippsland region illustrates the track from Tongio West and up the Charlotte Spur as a continuous route through to Bairnsdale via Notch Hill, Mount Baldhead, Ryans Peak and Bullumwaal. It thus connected the goldfield at Swifts Creek directly with those at Bullumwaal and the Nicholson River and, by connecting tracks, also with those of the Wentworth River and Haunted Stream.

This through-route was originally surveyed by Alfred Howitt and Surveyor Black and for many years it was known as "Howitt's Track". It was used in clement seasons by miners, by traders for the cartage of stores and other requirements to outlying gold shows and for the droving of sheep to the southern markets.


BOGONG
BENAMBRA
HOWITTS TRACK
TANJIL
SURVEYOR-GENERAL'S MAP
1874
Scale 1 inch to 16 miles

A matter of curiosity is the apparent transposition at some point in time of Mount Baldhead and Notch Hill. The early maps of the region show what we now call Notch Hill as Mount Baldhead and what we now call Mount Baldhead as Notch Hill. Such a change can well explain certain apparent inconsistencies in early writings where travellers from the south gave the impression of arriving at the heads of the Wentworth River before arriving at Mount Baldhead. By the mid-1880's the names were plotted as they are today.

As a consequence most importantly of the operations of Peter Forsyth with his custom and own-use mill at the Lady McGregor, the track up the Charlotte Spur was kept in reasonably good condition. In mid-1894, a regular mining correspondent of the Omeo Telegraph was able to report that it was "a good dray track at present".

During the years 1895 to 1899 in particular, the Department of Mines was active in the area, cutting new or reconditioning old tracks in the area.

In 1894, and 1895, Mines Department tracks were cut from Rileys Creek near the Charlotte Spur for a distance of thirteen miles to Haunted Stream at a cost of £138 and the track up Haunted Stream originally cut in 1888 was recleared and a new connection made to the Mount Baldhead Road, a distance of twenty-five miles in all at a cost of £145.

In 1896, an additional track was cut from the Haunted Stream to the Baldhead Road for the princely sum of £5.12.0. and another from the head of Tierneys Creek and Sheepstation Creek to Doctors Flat, a distance of ten miles for £66.1.4.

In March 1897, a contract was let for £10.0.0. to Mr. A.S. McDonald to repair the track up the Charlotte Spur, a distance of one and one-quarter miles. However, Mr. McDonald had to abandon the contract and it was then let to Mr. W.H. Ball, the second tenderer, who completed the work for £19.10.0.

In 1898, a one and one-half mile track was cut from Sheep Station Creek to the Perseverance and Conservative leases up the right hand branch of the creek.

In 1898 and 1899 the Mines Department constructed the road from Lower Swifts Creek to Brookville.

THE BALDHEAD ROAD

As a consequence of the needs of local traders to find a direct and economic route to the Omeo region, Mr. Sellars, the Engineer for the Shire of Omeo reported in 1890 upon a proposed route via Mount Baldhead. Amongst other matters he suggested that the length of the route would be only sixty-two miles, and therefore be substantially shorter than the then present road route via Tambo.

In 1891, the Bairnsdale Commercial Progress Association, representing principally the interests of the traders of that town, sought to finalise a direct and economic route to the Omeo region.

After a trial of the Mount Baldhead route by Mr. O'Grady on horseback in August of that year, the Association decided to support that route, "Howitt's Track".

The route selected was seen as not only providing access for trade to the exciting new goldfields being then developed around Long Gully (Cassilis), Tongio West and Nugong, and to the Omeo field, but also via Omeo to the Dargo Deep Lead field and the then recently boomed Mount Wills Tin-Field which,though a complete failure in tin became a substantial goldfield. The route was also seen to have the advantage of providing for trade en-route with the Bullumwaal, Nicholson River, Haunted Stream, Wentworth River and Gum Forest goldfields.

Mr. O'Grady must have been remarkably fortunate in his trial trip for in many other years,in August, the same route could be blocked by snowfalls, or at the best then normally be deep in slush and mud.

At that time and for some many years to come, the railway from Melbourne terminated at Sale and was of little advantage to Bairnsdale traders. Melbourne or Omeo traders could and generally did, transport their goods for the Omeo region and beyond by coastal schooner via the Entrance, and then to the small port of Mossiface on the Tambo River downstream from Bruthen.

At Mossiface the goods were loaded for transport by wagon or dray up the Tambo Valley Road, which in winter at that time was usually in a fairly appalling condition.

The coastal schooner trade route from Melbourne to Mossiface was sufficient at that time for the Bruthen Shipping Company to operate two schooners, the "Ethelle N.T." and the "John and Elizabeth".

Goods brought to Bairnsdale by coastal shipping from Melbourne were carried in schooners such as the s.s. "Despatch" and goods brought in on behalf of Bairnsdale traders but for forwarding to the northern goldfields were then transhipped by steam tender to Mossiface.

For a time, and in response presumably to the new road activities of the Bairnsdale community, even the Bruthen folk got into the act, seeking government support for a canal between Mossiface and Bruthen but this proposal was never seriously supported by others.

By August 1891, Surveyor Robinson had completed a survey for the proposed Bairnsdale to Omeo Road via Mount Baldhead, as far as the Bullumwaal Parish boundary for the Department of Lands & Survey.

In January 1892, the Bairnsdale Shire Council let a contract for an engineering survey of the first sections of the proposed road. The contract was let to Mr. J.J. Pickett for £277 and he was required to establish the road alignments and levels, so that no grade would be steeper than one in sixteen.

Mr. Sellars, the Shire Engineer at Bairnsdale reported in late March 1892, that twenty two miles of the engineering survey were complete but that the maximum grade incorporated was one in fourteen. He also noted that contrary to the estimate of 62 miles given in his report of 1890, the distance from Bairnsdale to Omeo via Mount Baldhead and Mount Deception was about 70½ miles.

During 1892, the Bairnsdale Shire Council advised Omeo of its intentions in respect of the Baldhead Road, but the majority of Omeo Councillors saw it as unnecessary, and as a scheme that could quite likely divert government funds from the Tambo Valley Road which was sorely in need of upgrading.

Not that Bairnsdale Shire Council itself was in unanimous support of the Baldhead scheme. Councillor Scott of Bairnsdale, in August of that year, voted against proceeding with the works until the Government provided more funds as the estimated total cost was £24,000 and the Shire had only £8,000 then available.

Interestingly, the £8,000 available had been originally voted for the municipal waterworks, a point of some surprise to the auditor of municipal accounts a little later.

At this time, the Progress Association was bolstering support for the road by suggesting that the new road would open up new land for settlement, but as was remarked, in response, "there have been hundreds of people over the route marked out by Mr. Howitt and they had never thought the land worth taking up".

In Omeo, Councillor Conant was a supporter of the road, believing that its construction could only benefit the Omeo Shire. In 1893, he was to propose that the Shire Engineer carry out a survey of the road within the Omeo Shire, but this was lost in Council seven votes to two. However, the vote in itself did indicate some small change in thinking.

Irrespective of both internal and external opposition Bairnsdale commenced construction of the road and by November 1892, work was described as being "entered upon Pell Mell".

In February 1893, Omeo gave Bairnsdale permission to clear the track from the Shire boundary towards Omeo. Concurrently, it was the opinion generally of Omeo folk that the Tambo Shire's lack of upkeep of its portion of the Tambo Valley Road was playing into the hands of the Bairnsdale Shire and other people supporting the Baldhead Road.

By November of the same year, Bairnsdale's Engineer was to report that the new Baldhead road would be cut and formed by Christmas, from Bullumwaal to Mount Baldhead, a distance of twenty-nine miles for £7,754 or about £366 per mile. The Council agreed to outlay a further £1,000 to upgrade the existing road from Bairnsdale to Bullumwaal. The Bairnsdale Advertiser was then calling it the best mountain road in Victoria.

In March 1894, Henry Foster, Member for East Gippsland in the Victorian Parliament, one time alluvial miner at Omeo, one time valuer and rate collector for the Shire of Omeo and shortly to be Minister of Mines, in company with Mr. J.H. McColl the then Minister of Mines, was driven along Howitt's Track from the Tongio West end to the new road. They then traversed the new road from Mount Baldhead to Bullumwaal and on to Bairnsdale.

In June 1894, Councillor Conant asked that the Omeo Shire Council instruct the Shire Engineer, Mr. George Seymour, to report upon the cost of making the road from Omeo to Mount Baldhead. He suggested that the road would assist the miners en route and provide Omeo traders with access to the business available at Bullumwaal, where three hundred miners were claimed to be then working. Council, again on a vote of seven to two, decided to stand the matter over for six months.

By 1896, the Bairnsdale Shire were in severe financial straits, substantially as a consequence of the works undertaken upon the Baldhead Road. The Bairnsdale Shire had spent £13,000 on the road to that time, and ratepayers were out for the blood of the Central Riding Councillors who were blamed for instigating the extravagence. The Councillors claimed that the cost of the new road had been warranted by having "opened up Sheepstation Creek".

Though the opening up of the goldfield at Sheepstation Creek or Brookville as it was then known was certainly nothing to do with the new road, it is however, correct to say that the new road had substantially cut cartage costs to Brookville, which were then about £2.15.0. per ton from Bullumwaal but £5 to £7 per ton from Swifts Creek.

Although in the summer months the new road was useful, certainly to those living and working along the route, winter conditions were another matter.

In September 1896, the Tambo and Orbost Times was indignant enough to remark that notices should be prominently displayed at Bairnsdale and en-route warning of the dangers attendant upon attempting to reach Omeo via the Baldhead Road, with its risk of heavy snowfalls and other dangerous conditions. They remarked that the Bairnsdale Advertiser, the ardent supporter of the road was located "where snow is unknown and violent storms never rage". As if to support this point of view, there was rainfall of 2½ inches in Omeo in a period of eighteen hours on 17th September.

A little unfairly perhaps, prominence was given by the Omeo Standard in November 1896, to the view of the contractors and teamsters moving the Parnell Battery from the Wentworth to Sheepstation, who said

the road was no good, had a rotten granite surface, many holes, no feed for the oxen, dry water tanks, etc. , and stated their general opinion that the road's inherrent difficulties would prevent it ever rivalling the Tambo Valley Road. At that time, the road proper to the north of Mount Baldhead had not been constructed, it being still basically in its Howitt Track condition.

The Tambo Valley Road in some respects was then little better, floods constantly cut and ruined the road and weakened the bridges. Many heavy items were often delayed weeks.

Bairnsdale interests continued their campaign to have the road completed. The mines to the north were continuing to develop and investment money continued to flow to the new developments, chlorination plants had been constructed and cyanide plants were mooted, a trade in pyritic concentrates was emerging and there were rumours of great schemes in the wind such as the Mount Hepburn that was to be shortly announced.

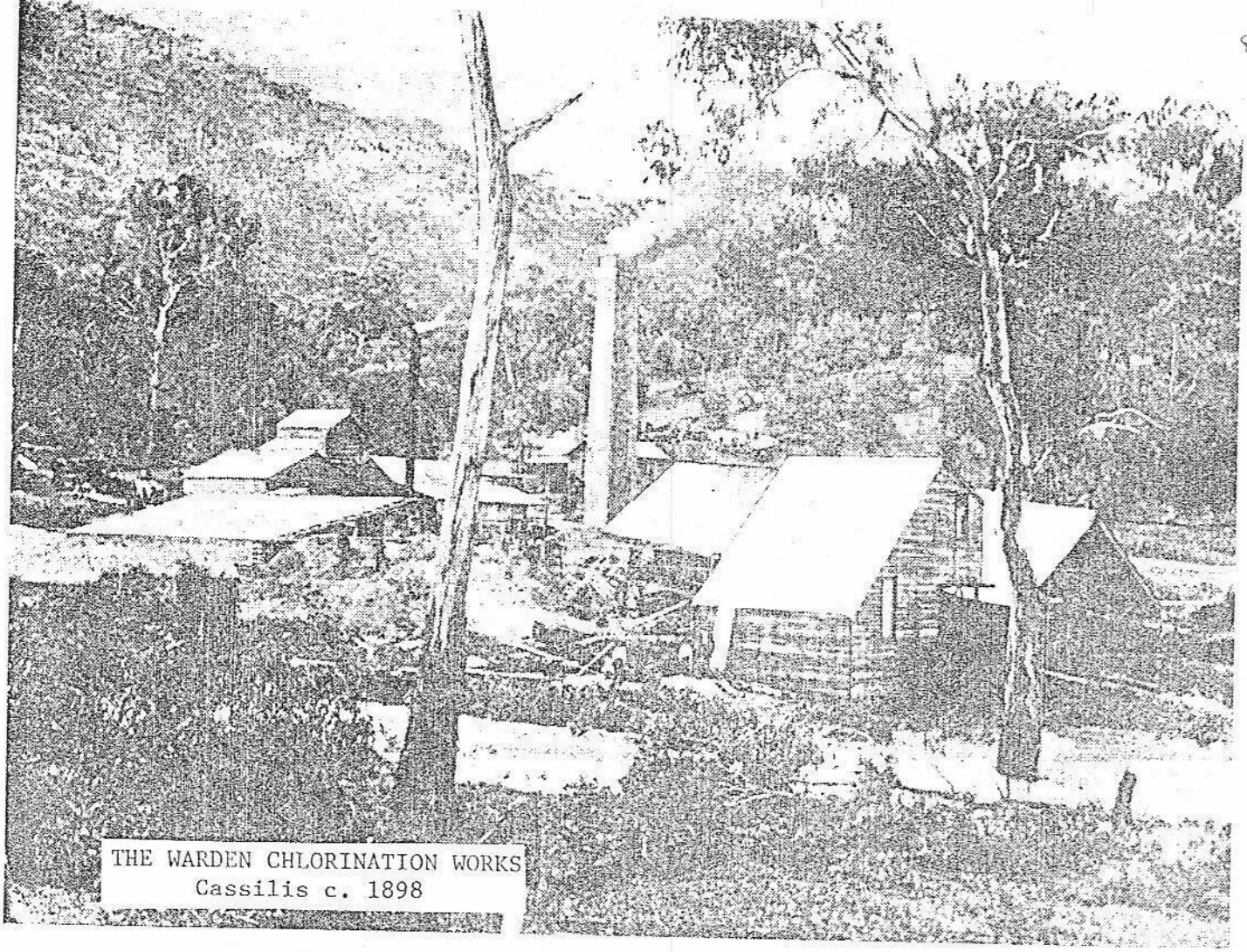
In July 1896, the Government, under pressure from Bairnsdale and partly at the instigation of Mr. Foster, announced a proposal to provide £5,800 for the construction of the remainder of the road from Mound Baldhead to Omeo, a distance of about thirty miles. At the same time, it was proposed to also provide £6,950 to upgrade the sixty miles of Tambo Valley Road between Bruthen and Omeo.

In response both to the Government's proposal to provide funds and a shift in public attitude, the Omeo Council towards the close of 1896 decided to advise the Public Works Department that they would be prepared to start construction of four miles of road, but cautiously that this would start at the Omeo end not at Mount Baldhead.

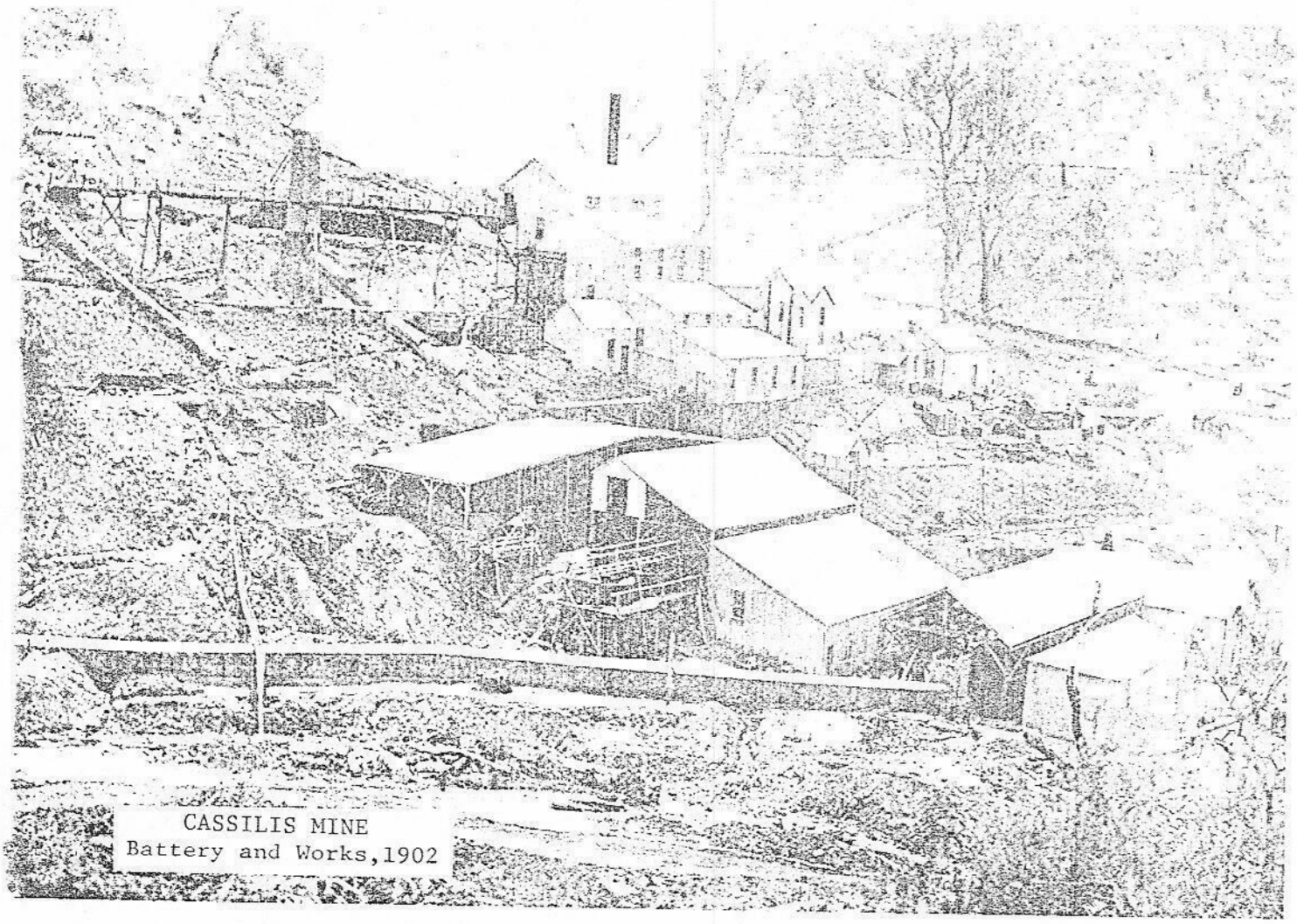
Into 1897, people still argued the merits and demerits of the Baldhead Road; the Shire of Bairnsdale becoming if anything an even more outspoken supporter. In June that year, the Baldhead Road was under four to five feet of snow.

Co-incidently in June, Mr. W.G. Davidson the Inspector-General of Public Works, tried to inspect the proposed route of the continuation of the Baldhead Road to Omeo but could get no further than Doctors Flat, because of snow both on the track to Sheepstation Creek and on the Baldhead Road itself. In a moment of candour, he passed the opinion that the Baldhead route was a "fair summer road".

In July the Inspector-General tried again, in company with George Seymour and the Omeo Shire Engineer, to inspect the route. However, as a consequence of heavy snow falling at that time, they mistook the route, took a wrong track and had to return.



THE WARDEN CHLORINATION WORKS
Cassilis c. 1898



CASSILIS MINE
Battery and Works, 1902

The Inspector-General, playing it fairly carefully and obviously under some pressure, stated that he saw no reason why the Shire should not commence the road from the Omeo end (that obviously being useful as access to Cassilis whether the high level Baldhead Road proper was built or not). The road was to be eighteen feet wide. Davidson was provided with a new plan and specification by Seymour and subsequently Council decided to apply for £500 to build a first stage from Omeo to Cassilis.

It had originally been the intention that the Mount Baldhead Road should remain on the main ridge through to Mount Delusion, coming out at the head of the presently known Cassilis Gap.

A meeting was held in September at Sheepstation (Brookville) where it was proposed that the route be altered to pass through the Highland Chief Mine camp, through Brookville Township and thence to go about 7½ miles via the Charlotte Spur to Tongio West, it being pointed out that the route via Mount Delusion was impassible in winter due to snow, whereas the proposed route was always passable and that further the proposed route saved seven miles of road formation.

Following upon a further inspection by the Inspector-General and a formal submission by the Shire of Omeo, the Shire were advised in December 1897, by the Minister for Public Works that the new route was authorised. The Shire Engineer, Mr. Seymour was instructed to survey the road via Charlotte Spur.

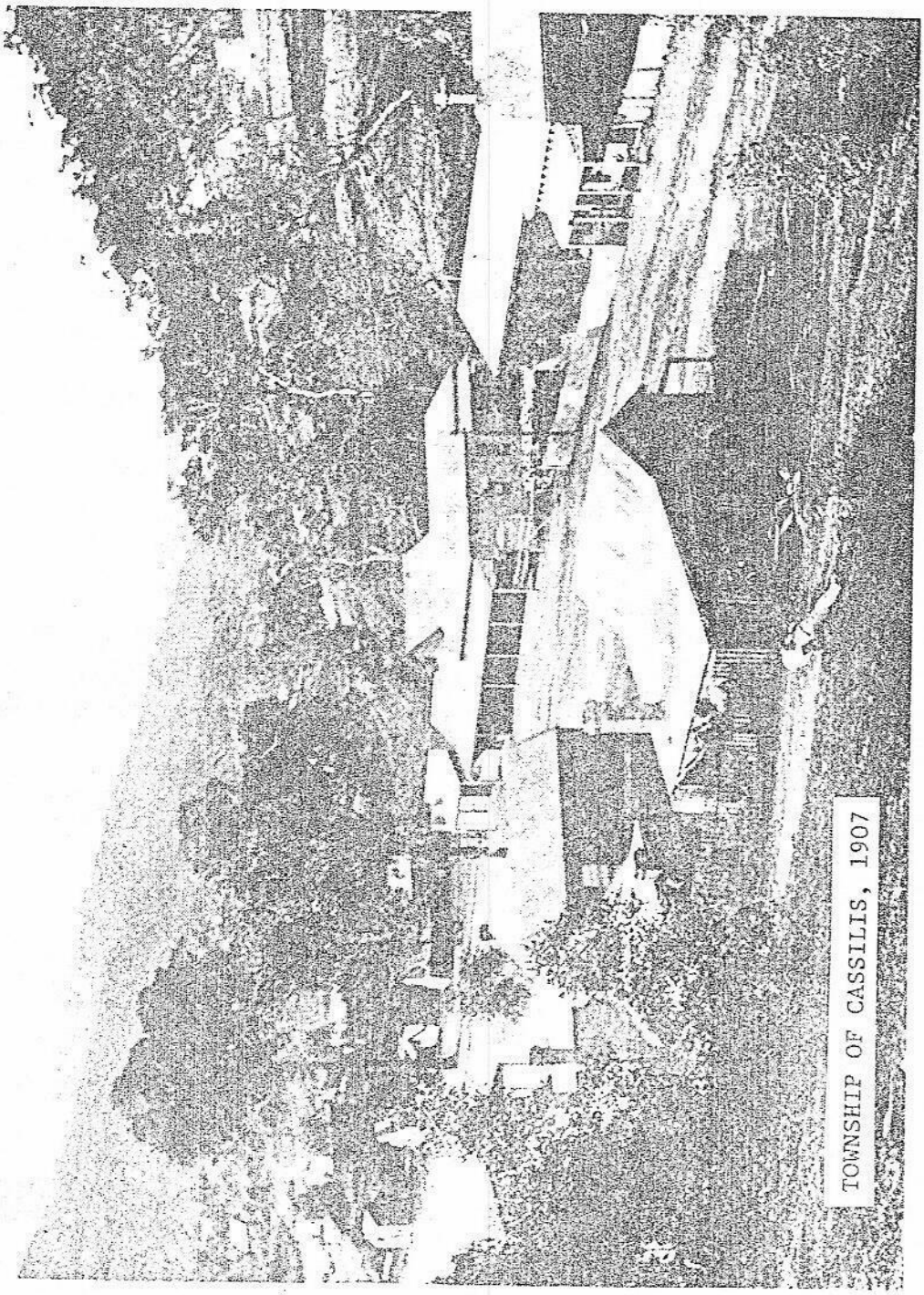
It seems that the Inspector-General was under some pressure to expedite the works, for in January 1898, he again inspected the route, in February he sought rapidly Mr. Seymour's specifications and drawings and upon a visit by Mr. Seymour to Melbourne in late February/early March, he had approved them.

CHARLOTTE SPUR ROAD CONSTRUCTION

On 15th March 1898, tenders were advertised for the formation of the Mount Baldhead Road in three sections from Wentworth Bridge to Brookville and, in three sections form the top of the Charlotte Spur to Powers Gully.

Tenders closed on 5th April and in respect of the Charlotte Spur Section the bids received were:

Section 1	Shelton & Baylis	£180. 1.10
	W.J. Parker	194. 9. 0.
	J. Tobin	145.19. 0.
	Wigg & Hyland	140.10. 0.
	T. Boucher	134.10. 4.
	Scott & Cusack	134. 5. 0.



TOWNSHIP OF CASSILIS, 1907

Section 2	Shelton & Bayliss	£425.12.11
	Scott & Cusack	405.15. 0
	Cookson Bros.	333. 2. 6.
	T. Boucher	260. 5. 0.
Section 3	Shelton & Bayliss	£570.12. 0.
	Cookson Bros.	389. 2. 8.
	Scott & Cusack	368. 6. 8.
	T. Boucher	343. 7. 6.
	M & D. Carmody	339. 6. 2.
	Wigg & Hyland	296. 5. 0.

The tenders of Scott & Cusack, Thomas Boucher and Wigg & Hyland respectively were accepted and by early May, Boucher had started his contract. In June Boucher also won the contract for formation of the road between the head of the Charlotte Spur and Brookville. The Shire Engineer, was paid five per centum of the contract sum to supervise and administrate the contracts on behalf of the Public Works Department.

In late September 1898, the contractors had completed their respective works from Brookville to Powers Creek via the Charlotte Spur. Charlie Cramer and a number of witnesses in the D'Arcy (Brookville) court case just then held at Bairnsdale were first to drive the new road in a wheeled vehicle, making Brookville to Omeo in 4½ hours, and taking ten miles off the normal route via Swifts Creek.

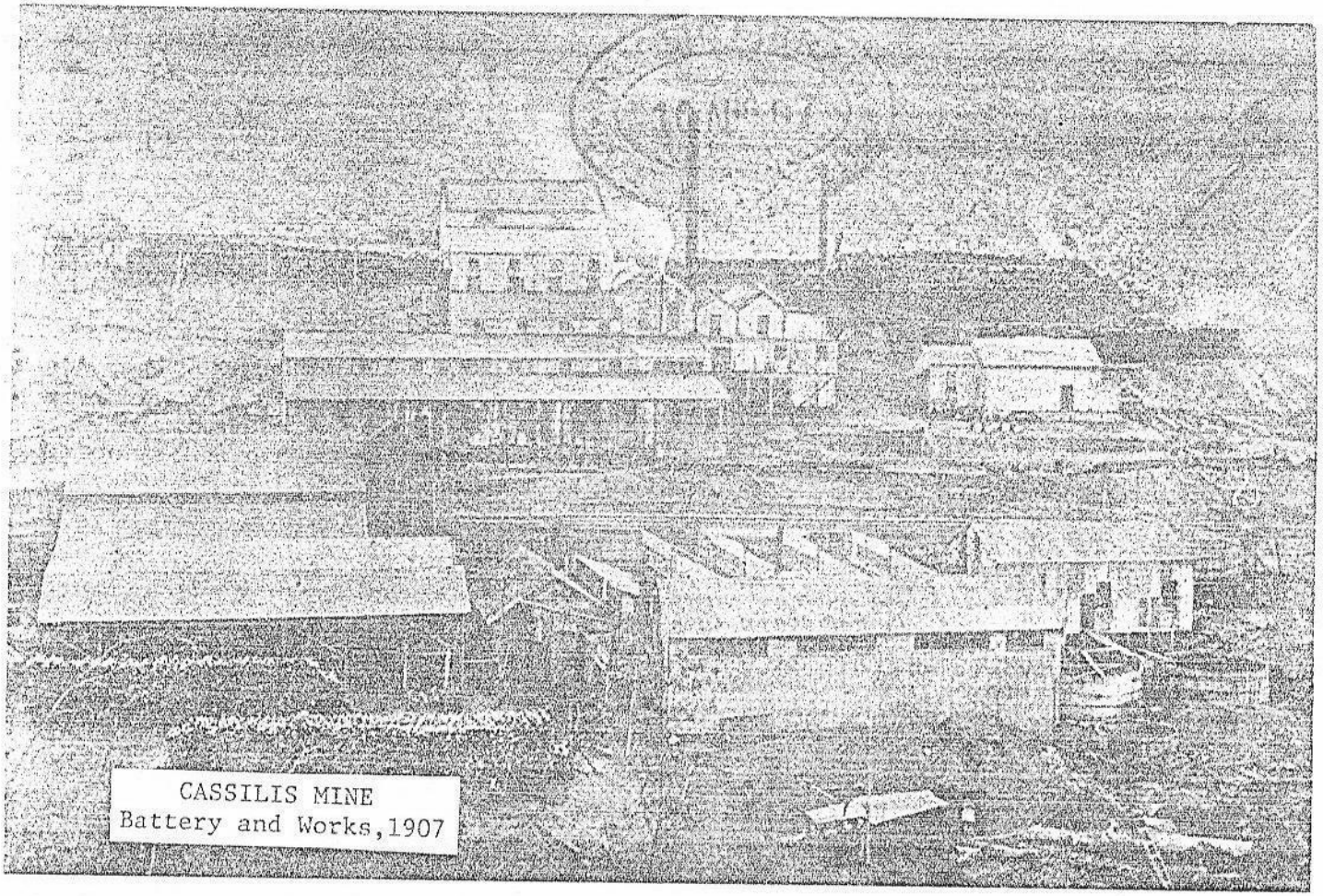
The pressures on Mr. Seymour, the Shire Engineer to expedite the works had been great. It transpired that he had inadvertently overpaid Boucher by £19.13.0. on his contract for Section 2, which with extras and deductions, came out finally at £355.5.0. Boucher agreed to refund the overpayment.

In preparation, Seymour had omitted some four chains of stone walling in the documents for Boucher's Section 2 which was in the steepest and roughest part of the whole route, being immense boulders and solid granite. This additional work cost £23.15.0. per chain, compared with £7.10.0. per chain for Boucher's more straight-forward work.

This matter of the extras together with the overpayment resulted in some rather heated exchanges between Seymour and Councillor Gibson at the September Council meeting.

Including all extras to the three contractors, the final cost of the Charlotte Spur Sections was £824.13.3. or in today's value of money, about $33,000.

Subsequently, at the December meeting, Council suspended payment to another contractor on the Mount Baldhead Road pending a second engineer's opinion. This was too much for George Seymour and he handed in his resignation on the spot. The row with the contractor concerned went on to 1900, much to the discomfort of the new Shire Engineer, Mr. Herbert Crowther, who took up his appointment in January 1899.



CASSILIS MINE
Battery and Works, 1907

COMPLETION OF THE BALDHEAD ROUTE

By the end of 1898, the works all the way from Mount Baldhead (or to be precise the Wentworth River Bridge) to Powers Creek were well nigh complete. The section through Cassilis Township and the section from the foot of the Charlotte Spur along Swifts Creek to Tongio West was let to T. Boucher in August 1899, for £444.3.1.

During the course of these works on the Mount Baldhead route and concurrent improvement works to the Tambo Valley Road, it became obvious that the old road between Swifts Creek Township (Swifts Creek Junction) and Tongio West needed improvement to facilitate the mail delivery,freight movement and passenger travel. As a consequence the Council let a contract of £294.0.0. to J. Tobin for the reconstruction of this route in October 1899.

In September 1900, the Inspector-General and the Shire Engineer agreed that the credit left in the allocation for the Mount Baldhead Road would be used to both upgrade the Omeo-Cassilis road which was considered to be an extension of the Baldhead route and to improve drainage on the road proper.

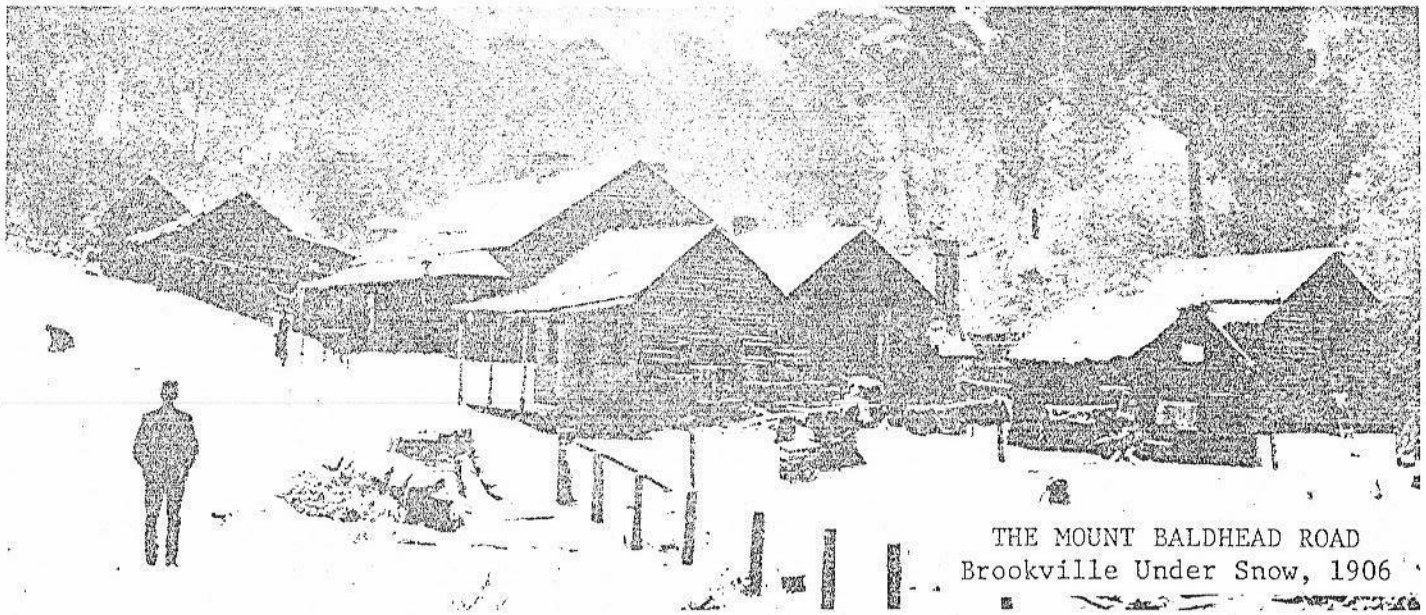
FINALE AND OBLIVION FOR THE ROUTE

Although in 1900, Mr. P.S. Ryan was able to state that tenders then called for cartage to Cassilis had favoured the Bairnsdale - Mount Baldhead route over the Mossiface - Tambo Valley Road, the Baldhead Road had not become the vital trade route envisaged by the Bairnsdale Traders. The Tambo Valley Road, now improved took almost all the through trade.

The road, particularly the older section, was neither constructed nor situated for all weather use and was regularly impassable, much to the frustration of the Bairnsdale Traders watching the growth of mines such as the Cassilis, the Maude, the Yellow Girl and others and also for a period of growth in export to Melbourne, Bendigo and even Germany of pyritic concentrates and the like.

As an example of the problems encountered, one reads that in August 1899, Messrs.Ryan and Crisp took the Baldhead Road from Bairnsdale and found the section to Bullumwaal to be a quagmire in places, with mud to axle levels. When only thirty miles from Cassilis, they found that the next sixteen miles ahead was snowcovered and they were forced to return to Bairnsdale and take the route up the Tambo Valley. In all, the trip took three days longer than expected.

In 1900 also, the Bairnsdale Shire Council, pressed by the Progress Association, were requesting funds from Mr. Davidson, the Inspector-General, to upgrade and complete works on their older section of the Baldhead Road.



THE MOUNT BALDHEAD ROAD
Brookville Under Snow, 1906

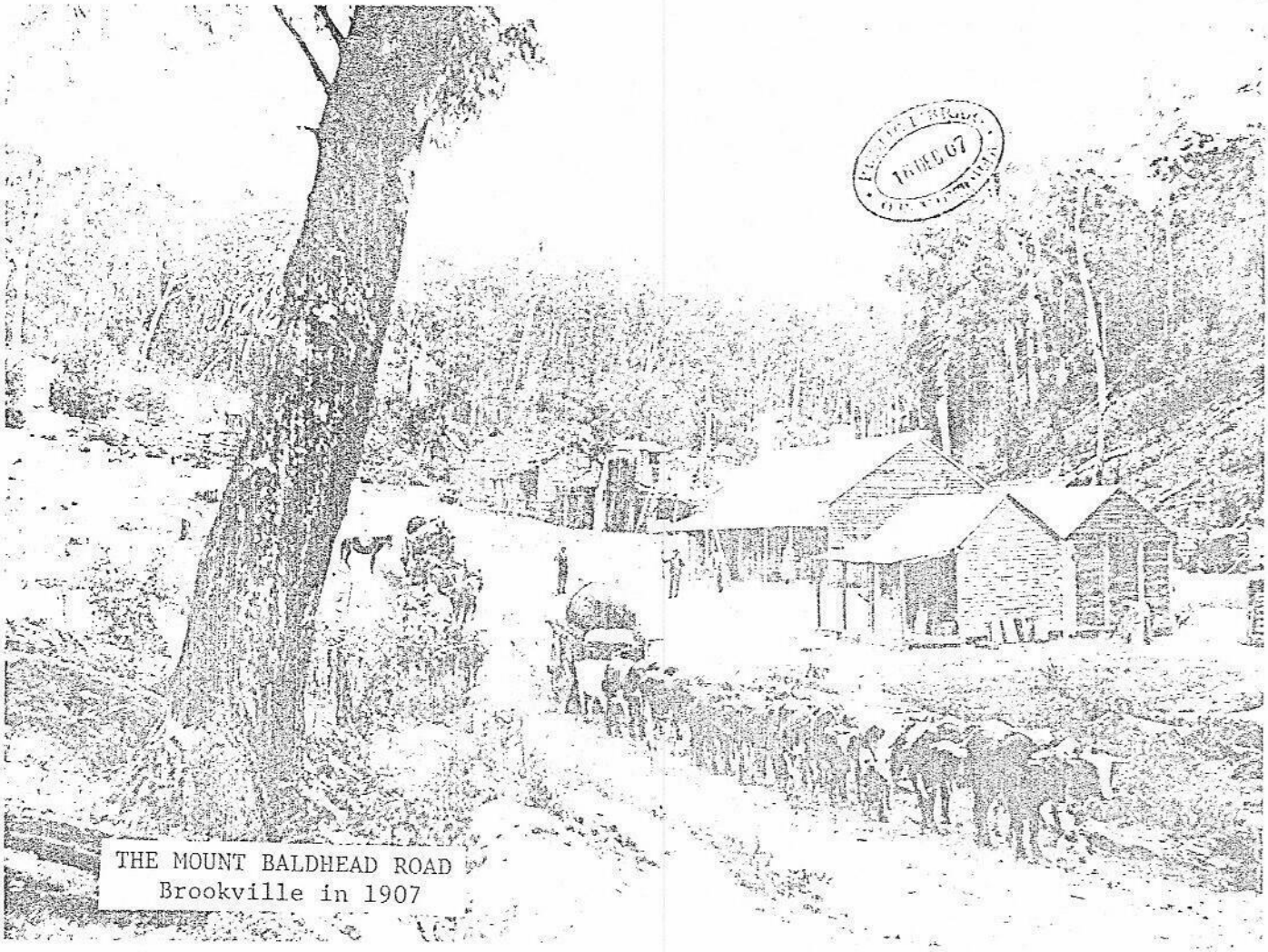
As far as Davidson was concerned this was the final straw. He had never really supported the Mount Baldhead Road concept but had obviously been directed by the Government under the pressure of local groups to acquiesce. In February 1901, he reported that he could see no reason for the road other than in a few isolated spots and he was not prepared to recommend any further funds to improve the road,or to make good works left deficient by the original contractors.

In the same month Mr. Henry Foster remarked that the Inspector-General had finally layed the Mount Baldhead Road to rest and that the Omeo Council should now give their utmost attention to the Tambo Valley Road and silence the sniping critics.

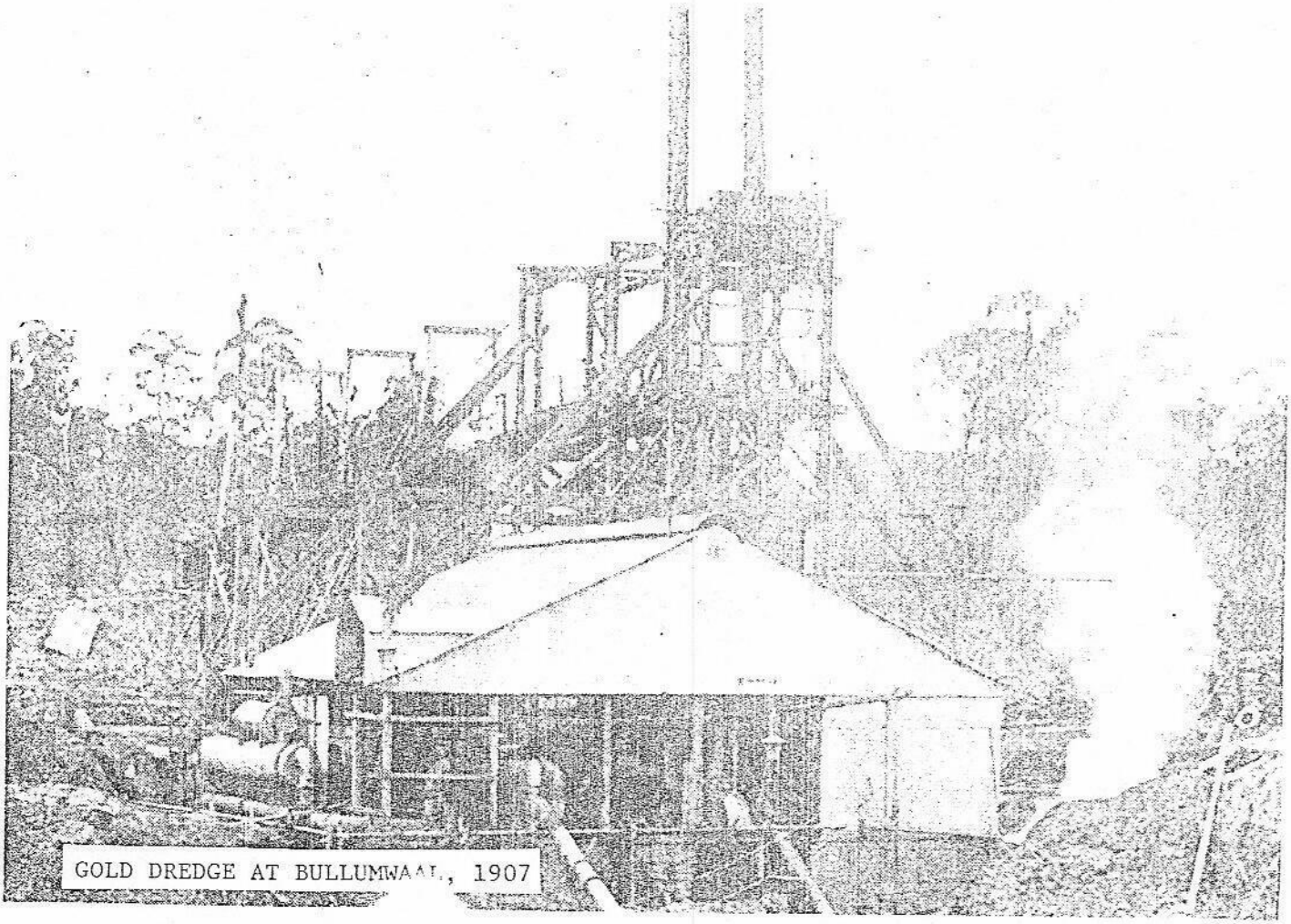
Though Bairnsdale even then continued to press for additional works on the Baldhead Road, Omeo gave it little more attention. In late - 1902, when the Shire Engineer recommended an expenditure of £24 on it, Council voted £5 only.

In February 1901, Mr. P. Campbell, the resident Surveyor at Tongio West for the Department of Lands & Survey, completed his road reserve alignment survey and that together with the Inspector-General's comment of the same month may well be taken as Finis to the scheme.

Within a further ten years, the road was well nigh abandoned as a continuous through road. In 1912 a man was paid £5 per annum to cut trees off the route.



THE MOUNT BALDHEAD ROAD
Brookville in 1907



GOLD DREDGE AT BULLUMWAAL, 1907

THE JIRNKEE WATER RACE

An historical sketch and appreciation of the Jirnkee Water Race from the Wentworth River to Long Gully.

****

John B. Griffiths
Axedale Mining Co. Pty. Ltd.

INTRODUCTION

Working of the alluvial deposits in Long Gully along Grays Creek, whether by sluicing or hydraulicking was severely hampered by seasonal water shortages. The answer to that handicap, as first seriously suggested in 1896, was to construct a water race from the heads of the distant Wentworth River.

When subsequently constructed, the Jirnkee Water Race became, and was to remain the longest privately owned race in Victoria.

EARLY DAYS

As has been noted in the report on the Charlotte Spur, the alluvial gold deposits in the Swifts Creek and around Tongio West may well have been first found in 1850 or 1851, and were definitely being worked by 1854.

In the early years, alluvial gold mining was carried out for the length of Swifts Creek from the Tambo River to the Eureka Creek, and in Rileys Creek.

Subsequently, the Chinese miners who in alluvial formed the majority after the mid-1860's, extended the alluvial workings up Grays Creek, through Long Gully.

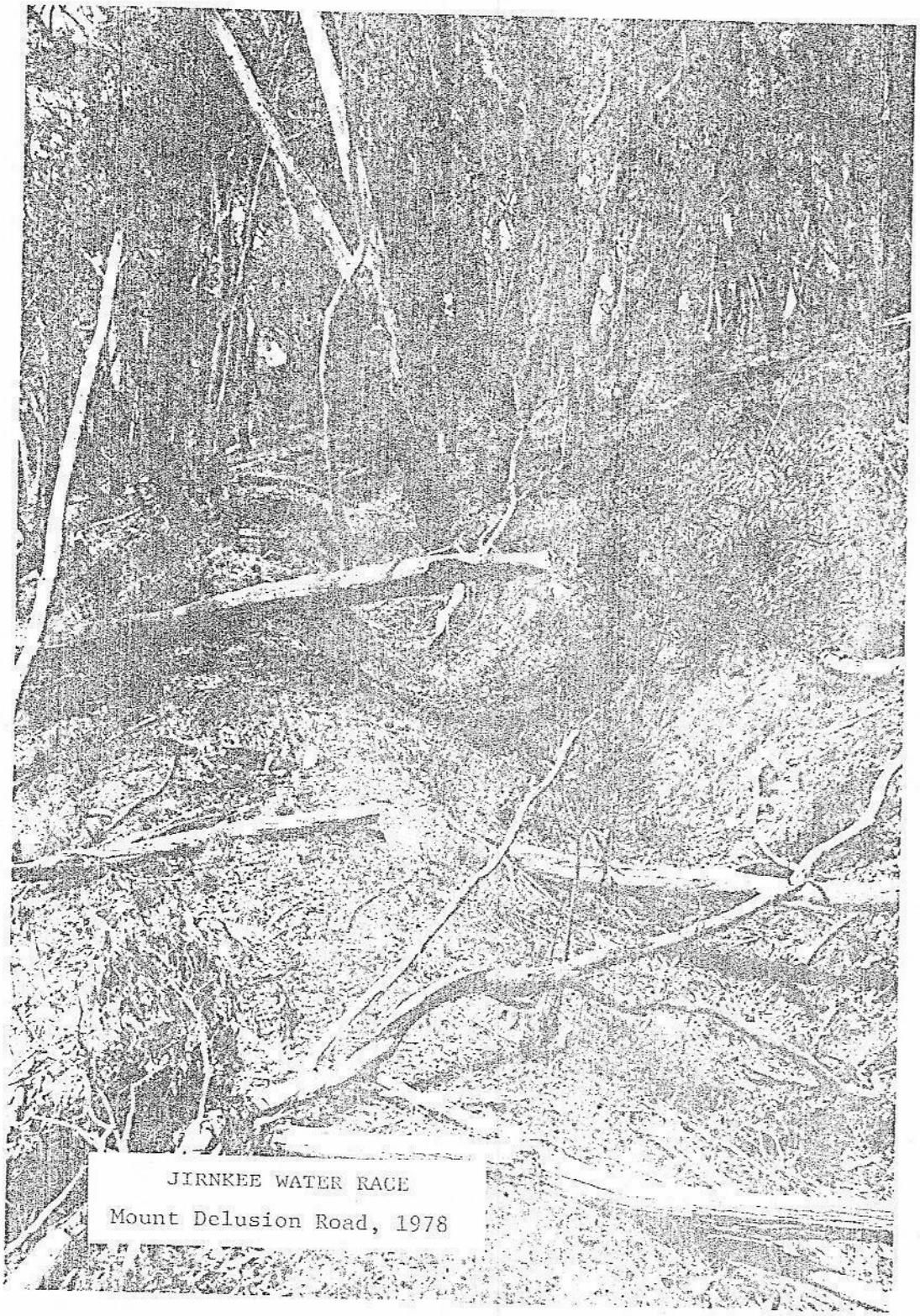
Throughout the 1870's and into the early 1880's alluvial was the predominant mining in the area, reefing being generally at a low ebb during that period subsequent to the bursting of the initial bubble which lasted five years in the late 1860's.

At times the population of alluvial miners in the immediate area exceeded one hundred. In the mid-1880's however, the alluvial population reduced to less than forty and by 1890, alluvial mining was an insignificant contributor to local income.

It might be estimated that some 75,000 ounces of gold were obtained from the alluvial workings in the Swifts Creek area by 1890.

NEW INTEREST IN 1890

During 1890-91, the Long Gully and Nugong Prospecting Association explored parts of the alluvial flats in Long Gully which is the valley of Grays Creek, using funds from the Government's Prospecting Vote.



JIRNKEE WATER RACE

Mount Delusion Road, 1978

By the latter half of 1894, the adit, well timbered, sheeted overhead with corrugated iron and ventilated at appropriate positions by means of prospecting rises to the surface, had reached the one thousand foot mark.

By this time also, O'Sullivan & Party, a group of six, were operating as the Working Miners Company, were continuing to obtain returns adequate more or less to cover their development costs, the returns perhaps being 1 dwt. per load, and were getting close to the old Stuart & Co.'s ground which was anticipated to be highly remunerative and which had been abandoned originally because of heavy water.

The apparent success of the Working Miners attracted others to the alluvial. By the close of 1894, almost all the ground along Swifts Creek from its junction with the Tambo River up to and above Chin Cha's old camp was occupied by people from all walks of life, trying their luck.

As is usual in such mini-booms, both the experienced hands' and newcomers' enthusiasm and excitement had been fired by rumours of valuable strikes. For example the yarn, for that is all it was, that a party of four men were getting two ounces of gold per day in Swifts Creek just below Ryan's Brave George Battery at Tongio West.

Throughout 1895, the Working Miners pushed on with generally satisfying results but as summer heightened, they suffered from the same problem experienced by others many years earlier, lack of water for treatment. During the larger part of that summer of '95 to '96 they were forced to stockpike some 800 loads of payable wash whilst awaiting the rains.

Some rains came in February 1896, but did they come in March! They came to such an extent that the Company's underground and bank workings were severely damaged, in fact largely washed away in the resulting flood.

However, Thomas O'Sullivan and his partners were men of drive and whilst restoring some of their workings and repairing and rebuilding their plant for washing up, they continued to mine and stockpile their wash. In August 1896, they washed up their stockpile of eight months which must by then have approached 1500 loads, for the welcome return of 4 dwts. per load, perhaps 300 ounces of gold.

In the same month of August they applied to lease new and additional ground at Cassilis. Their first lease at the "Engine Shaft" as it was to be known, was granted in October, 1892.

For a long time then, the knowing members of the mining community around Long Gully, Tongio West and Omeo had expressed the view that the Working Miners Company held a potential suitable for large investors, and this of course could well have been an additional spur to the drive within the group.

LONG RACE PLANNED

The company approached a Melbourne Sydnicate with the suggestion that if water could be brought by a long race from the Wentworth River, then the whole of the length of the Long Gully alluvial was available for sluicing.

As a consequence, Mr. Corbett, an experienced mining and hydraulic engineer and surveyor was sent to Cassilis in November 1896, on behalf of the syndicate.

Corbett's investigations supported the feasibility of the Wentworth race proposal and he reported that enough water would be available to wash down the whole of Long Gully if that were desired.

By the close of 1896, the route of a race said to be twenty-six miles long had been roughly surveyed from the Wentworth River. It was planned to start about two miles above the Dargo Track crossing, from where it was to go to Livingstone Creek at Grover's, cross the creek by flume at Little Plain, on to Johnson's and thence across the range near Cassilis (Poynton's) Gap and run down the Gully to the Working Miners leases at Cassilis.

Application was made for the diversion via the race of 12 million gallons of water per day and the cost of race construction was then estimated to be £2,000.

At the close of 1896, the Working Miners ground covered three leases respectively of about 13 acres, 12 acres and 10 acres. Their ground embraced about one mile of the length of Long Gully, starting at the upstream end at the Hope Battery at Cassilis then owned by the Warden Gold Mining Company.

It was estimated at the close of 1896 that the Working Miners group of six people had produced approximately 800 ounces of gold since 1892. Of this product, some 50 ounces had been in the form of nuggets up to a size of 2½ ounces.

During 1897, the Working Miners continued their operation, now with some support from their Melbourne backers, and took up new and redefined lease areas. Two of their leases were subject to suspension of the labour covenants for a period of three months in the latter half of the year.

By mid-1898, the Company was holding four leases, Nos. 2582, 2583, 2847 and 2848 Gippsland. In July, work on these leases ceased and a total suspension of the labour covenants was granted for three months pending completion of a detailed and final survey of the race from the Wentworth River.

In October the first section of the survey had been completed but a further total suspension of two months was granted for all leases pending the raising of capital in London.

THE JIRNKEE COMPANY

In 1898, a company was formed in London, known initially as the Jirnkee Gold Mining Company Limited, but subsequently it was titled the Jirnkee Hydraulic Sluicing Gold Mining Company Limited.

The Company had a nominal capital off£40,000 in 160,000 shares of five shillings each, all of which shares were in time credited with being fully paid up. How much of the capital was applied to purchase of the Working Miners' property is not presently known.

In December 1898, the new company applied for the first lease in its own name, of one hundred acres, which when granted and together with the four pre-existing leases gave them approximately 185 acres of ground. Their ground stretched about four miles from the Warden Company's Battery at Cassilis, downstream to Chinaman's crossing about one and one half miles below Tongio West. That latest lease of one hundred acres was later granted as No. 3471 Gippsland.

Early in 1899, the overseas money started to appear and Mr. Robert R. Hedley, who was widely experienced in hydraulic sluicing, was appointed General Manager, a position he retained until late 1900 when succeeded by Mr. Boyle. The Company proposed to spend £15,000 to erect plant and machinery and construct the race from the Wentworth River, which to this day is known as the Jirnkee Water Race.

The Head Office of the company was in London but there was also a local office in Melbourne. Although it was London based, its capital was raised principally from French investors. The Chairman of Directors was the Baron de Grandmaison, who claimed to have had a considerable experience in mining enterprises in various parts of the world.

The Baron made a number of visits to Tongio West during the life of the Company, probably more than he might normally have expected to make and probably as a consequence largely of the company's disappointing performance.

On his visit in the early months of 1900, considerable publicity was given over to his offer to allocate a small percentage of the shares in the Company to local investors: whether his offer was taken up to any extent is unclear.

Both the Baron and Robert Hedley were full of confidence during the first year of development work, pointing out that the operations of the Working Miners Company and their own tests indicated that an almost unlimited supply of 1 dwt. plus ground was available. It was in fact their published opinion that the poorer ground contained not less than 1 dwt. per load.

If the ground contained a grade of the order suggested then obviously the Company had an extremely valuable asset and a potential for generating substantial profits.

Many dredging and sluicing companies and groups were operating successfully and paying dividends on grades ranging commonly but not exclusively between one-tenth and one-quarter dwt. of gold per cubic yard (2.4 to 6.0 grains per cubic yard).

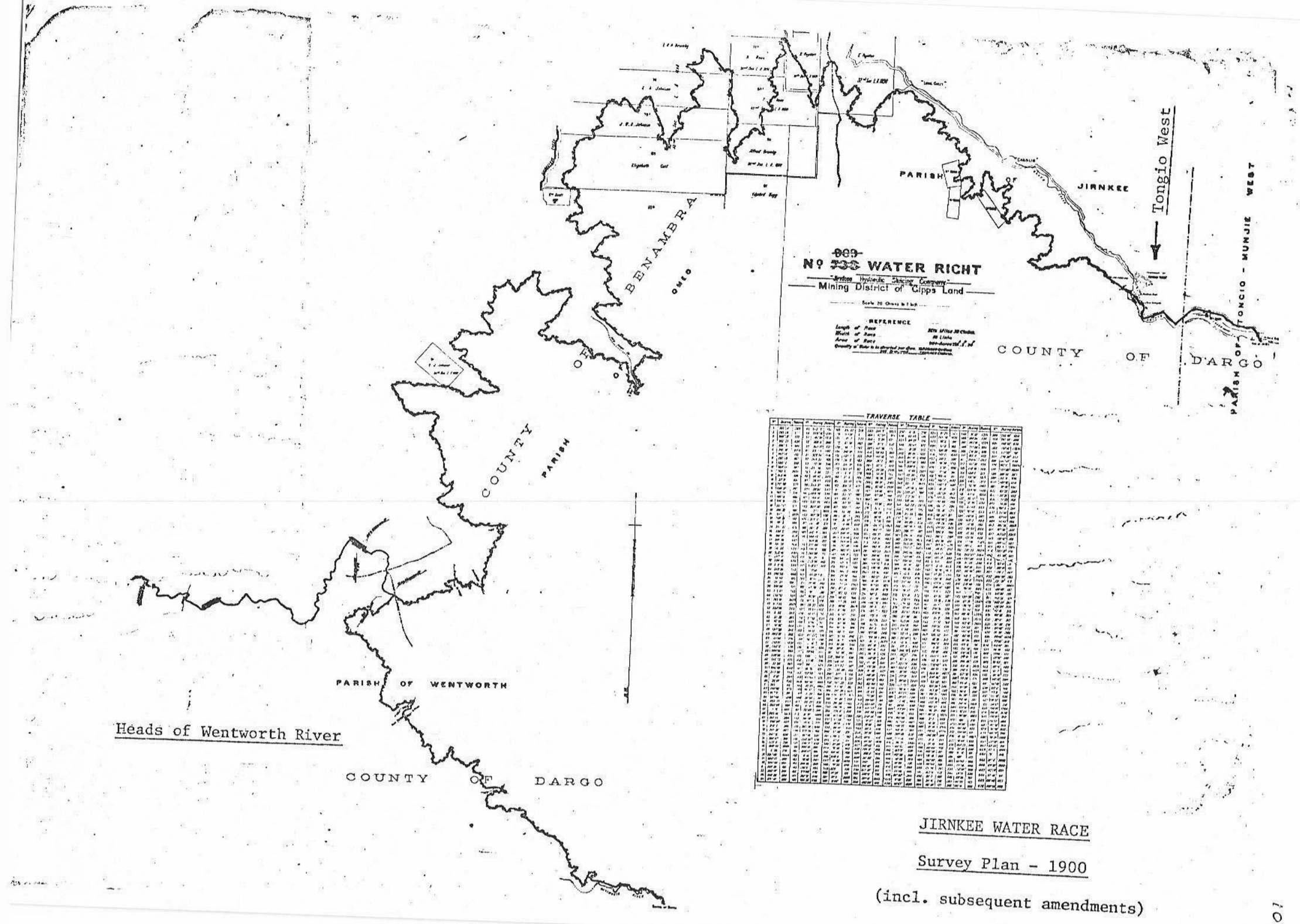
In fact, during the period 1900 - 1912, the average return from all dredging and sluicing in Victoria was 2.23 grains per cubic yard, a little less than one-tenth dwt. per cubic yard.

The most economically operated sluicing of gravels was carried out in the neighbourhood of Mitta Mitta Township. Though difficult to believe, it is officially recorded in one particular year that one million cubic yards of gravel beds at Mitta Mitta were sluiced for an economic return of 250 ounces of gold, that is a return of about one-ninth of a grain of gold per cubic yard.

In his initial forecasts, Robert Hedley expected to treat 100 cubic yards per hour to an average depth of thirty feet. He expected to cover an area of about ten acres per year, with an allowance of time made to move the barge and adjust ancillary plant and equipment. He anticipated ten years of working from Tongio West upstream to the Warden Battery.

If we mark down his forecast a little for normal down-time, he was therefore expecting to treat around 500,000 cubic yards per year, which, at his and the Baron's stated minimum grade of 1 dwt. per cubic yard, would yield not less than 25,000 ounces of gold each year.

As we will see this happy state was not achieved.



JIRNKEE WATER RACE

Survey Plan - 1900

(incl. subsequent amendments)

THE RACE IS CONSTRUCTED

Contrary to the earlier indications that the race would be about 26 miles long, it was in 1899 estimated as 46 miles. Subsequently with an additional branch built late in 1902 to pick up further heads of the Wentworth River, the total surveyed length of race reserve became 56 miles 38 chains in length and, with a reserve width of 50 links contained an area of approximately 226 acres.

The Race, held under Water Right No. 738 (subsequently No.909), was certainly the longest private race in Victoria and in length would challenge even the major public irrigation channels of Victoria.

Initially there was a water entitlement of 12 million gallons per day, but subsequently this was reduced to 7 million gallons. The company considered that the race had a daily capacity of 8 million gallons.

The first nine mile section of the race was let under contract by the Company to Roberts, Lowe and Party in April 1899. Subsequently, tenders for the remaining 30 miles or so to the Cassilis (Poynton's) Gap were found to be too high and the work was carried out by Company day labour.

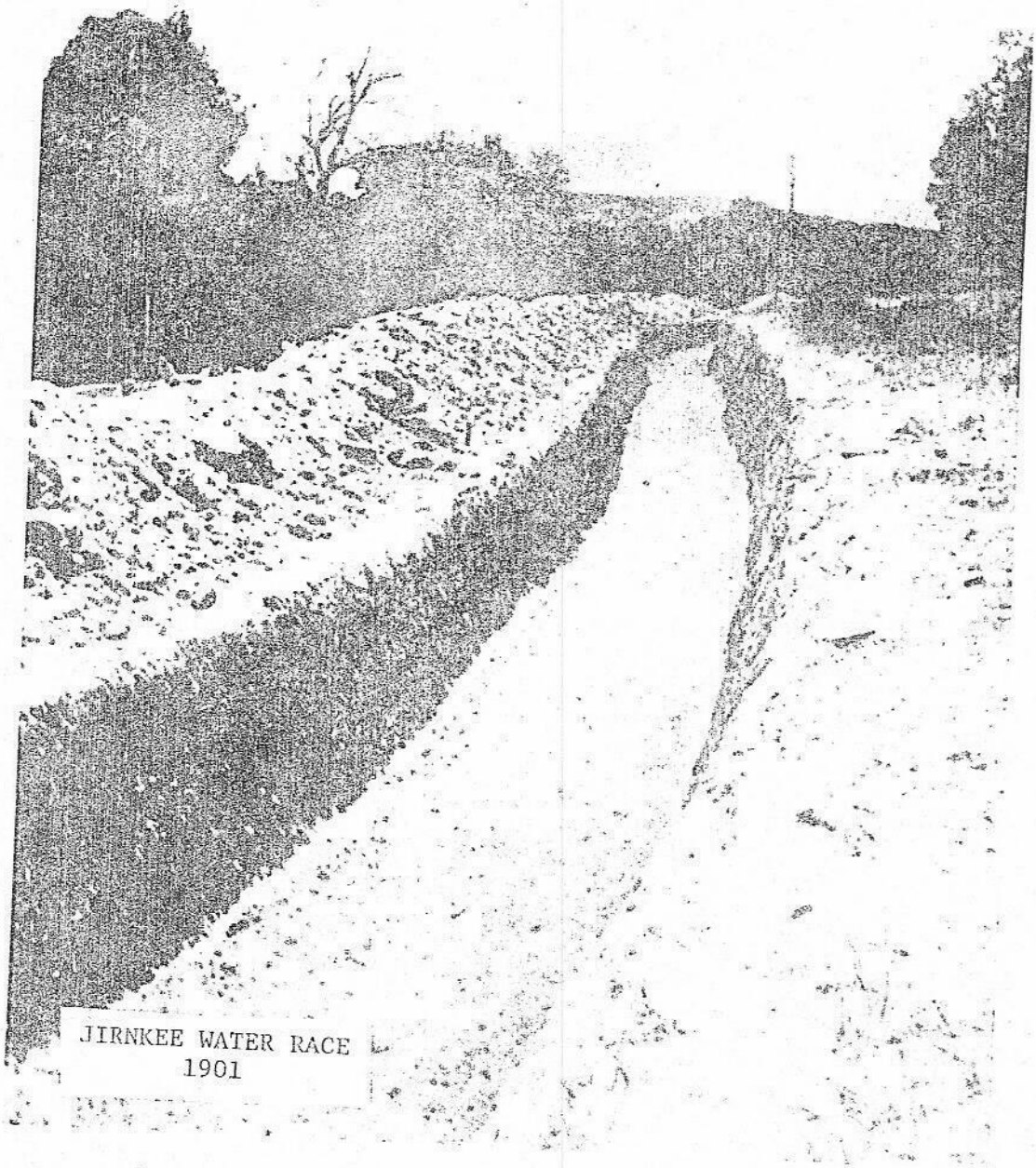
The rates of pay offered by the Company caused some trouble in the district, the rates reaching eight shillings and four pence per day, a figure approximately the same as that then paid to miners in the district who had to accept far worse conditions and greater risk than those on the race.

It had been the Company's original intention to pipe the water from the head of the Gap to an electrical generating station at the foot, some 500 feet below, but later in 1899 it was realised that the unnecessary length involved in electrical transmission from there to Tongio West which was to be the initial starting site for the plant, would entail unwanted penalties.

As a consequence, it was decided to loose some elevation naturally by free fall discharge into and down what is known as Waterfall Gully below the Gap and from there take it 8½ miles by race to a point at an elevation of 500 feet above Tongio West. From there it was to be carried by pressure pipe to the plant for both generation of electric power and operation of high pressure nozzles.

Tenders were called for this last 8½ miles of race in November 1899, and the then whole race was finally completed about the end of July 1900. It then had a constructed length of 48 miles.

In 1899, the cost of the race had been estimated at £4,000 or twice the amount suggested when first mooted in 1896.



JIRNKEE WATER RACE
1901

In fact, the Company had expended approximately £14,000 on the 48 miles of race by the time of its completion in 1900. Financially a disastrous start to their operation.

THE JIRNKEE PLANT

The machinery and equipment was mounted on a 35 ft. x 20 ft. floating pontoon located in its own pondage at Tongio West. The pontoon was anchored by guy ropes to nearby undisturbed ground and the programme was to advance the pontoon and plant progressively upstream towards Cassilis.

Should the operation at Tongio West have been successful then the company had intended to duplicate the pontoon and plant with another, to work upstream from Chinaman's Crossing to Tongio West.

Initially, the operation focussed upon the use of a fifteen inch centrifugal gravel pump to the Wallace Hedley design, mounted on the pontoon and claimed to have a capacity of 150 cubic yards per hour under suitable conditions.

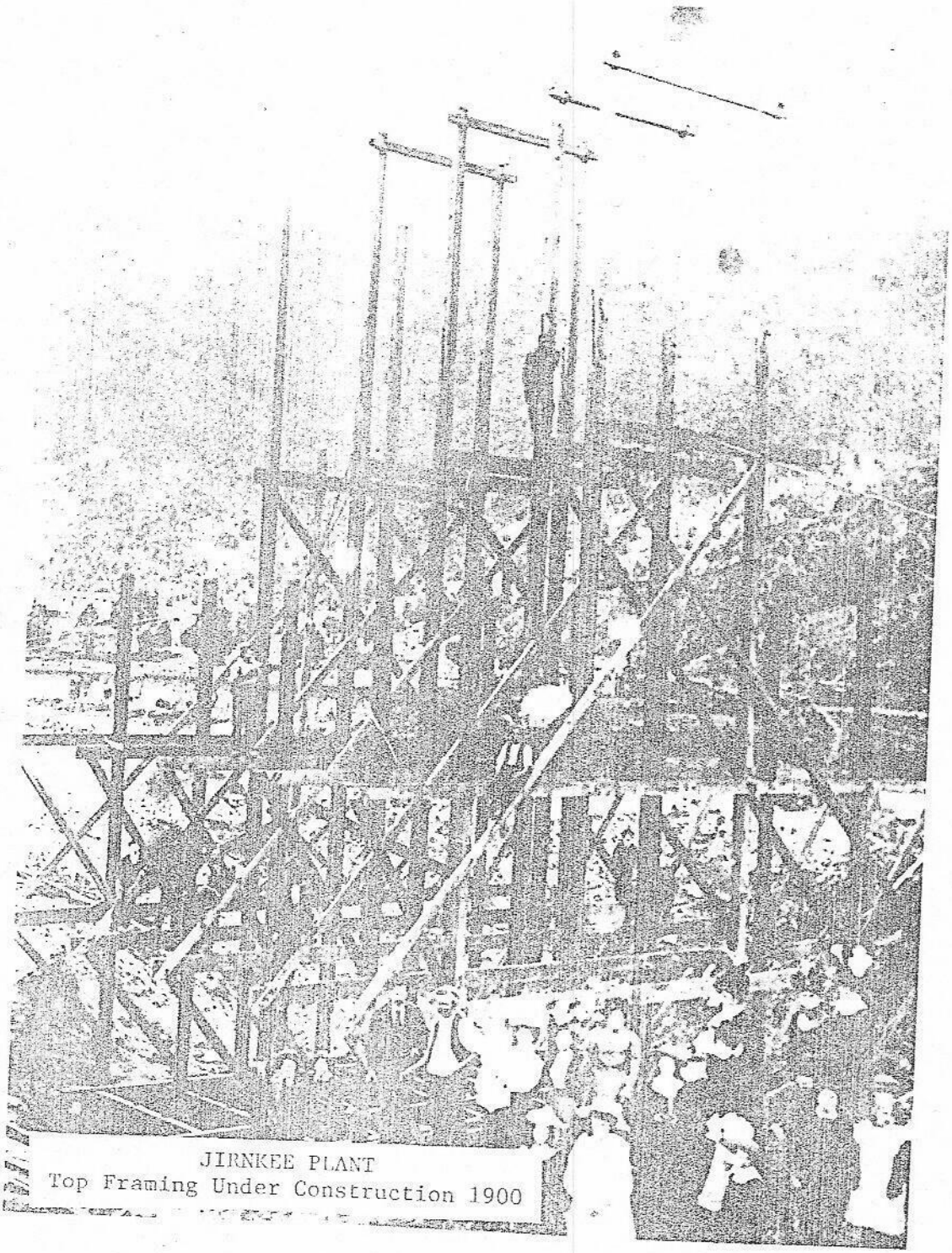
The wash was hydraulicked by a Giant or monitor nozzle operated on the pontoon, and washed to a sump in the pondage bed. The inlet of suction line from the pump was located in the sump.

Discharge from the pump was to elevated steel sluice boxes seven feet wide and eighteen inches deep, mounted on an elevated framework of heavy oregon timbers above the pontoon. Course gold was trapped in the sluice boxes by removable riffles, the finer gold by coconut matting and the waste being discharged well clear of the pontoon into downstream ground.

Hedley had determined that it would cost about £4,000 per year for firewood alone to fuel a steam boiler and engine of sufficient power to drive the pump and other ancilliary equipment including an electric lighting plant.

He concluded that it was more economical to provide electrical power to the pump and other equipment since this could be installed for an initial once-off capital outlay of £5,000. The economics became even more attractive after the decision to locate the electrical generation plant at the pontoon and not at the foot of Cassilis Gap as originally intended.

Consequently, a Pelton wheel of 350 horsepower was installed, the motive power for which was provided by water brought under pressure via rivetted steel pipe from their water race terminating high on the western hillside above Tongio West. Electrical power was generated by a Parker dynamo driven by manilla ropes from the Pelton wheel.



JIRNKEE PLANT
Top Framing Under Construction 1900

The whole of the plant at Tongio West was illuminated for night time work by six large arc lights, themselves drawing a current of thirty ampheres each.

During the course of 1899, plant and machinery and materials for construction of the pontoon to take them were ordered. In November, tenders were called for the transport of some 100 tons of equipment and materials from the port of Mossiface on the Tambo River below Bruthen, to Tongio West.

By January 1901, the pontoon, plant and machinery had been completed and in the same month were subjected to commissioning trials which were announced as satisfactory.

In the latter half of 1900, the centrifugal pump arrangement was found to be unsatisfactory in trial operations. Under the direction of Mr.Boyle, the new Manager, it was replaced with the form of arrangement known variously as the jet elevator, hydraulic elevator or jet pump.

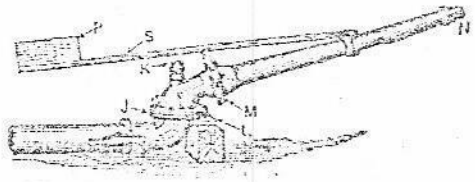
The use of gravel pumps in Victoria and for that matter generally elsewhere in the world for the mining of auriferous wash, was relatively unusual. They were notorious for their excessive costs in wear and consequential renewal and repairs. Their most successful use had been in South Africa, where it is noticeable that the pumps in use were eight inch and not the fifteen inch used by Jirnkee and were fitted with renewable impeller shoes and renewable linings. These successful pumps had a production rate of about 24 cubic yards per hour and were direct coupled to fifty horsepower electric motors.

One suspects that the actual throughput of the Wallace Hedley pump installed at Tongio West failed to achieve anywhere near its anticipated throughput of 150 cubic yards per hour,possibly because of an inadequate suction lift height, that the effective electric power available may well have been inadequate to drive the large pump, and that maintenance costs were anticipated to be too high.

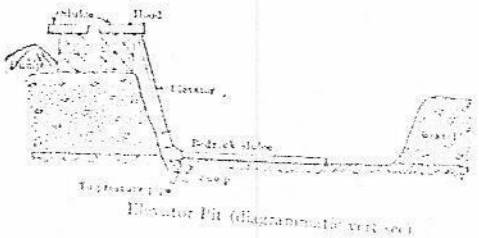
The jet elevator arrangement using Kershaw equipment was in operation at the Jirnkee from its commissioning trials in January 1901.

In this system a powerful nozzle is inserted into the base of an upcast pipe, in the Jirnkee case 12 inches diameter, the side entry to which is located in the pondage sump. The force of the jet entering the upcast delivery pipe elevates a column of aerated water mixed with the wash sucked in as a result through the side entry in the sump.

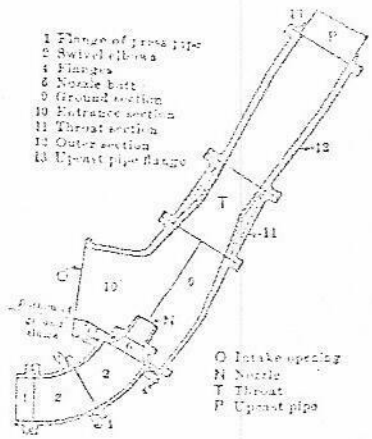
The jet elevator system is most suitable for depths of twenty to thirty feet, as found at Tongio West, but is generally considered to be inefficient and wasteful and only useful where there is an abundance of high pressure water available.



GIANT HYDRANT AND NOZZLE



Elevator Pit (diagrammatic vertical)



JET OR HYDRAULIC ELEVATOR

As with the gravel pump technique, the jet elevator is seriously hampered in the presence of large boulders and buried timbers, in fact, the jet elevator principle is recognised as not appropriate at all when such obstacles are numerous. The removal of the obstacles requires either regular blasting or handling out of position by a derrick provided for the purpose.

In Victoria the jet elevator system was relatively uncommon, the vast majority of surface alluvial being worked by bucket dredge or straight hydraulic sluicing.

At the Jirnkee there were two Giant nozzles of 2¼ inch size, both operating at the pressure of 250 pounds per square inch provided by the elevated race.

At Tongio West, the Jirnkee were to suffer from inconsistent and insufficient water supply being available in their race and oversize boulders and timbers in their workings. In fact, at one stage they encountered the timbering of the earlier Chinese workings underfoot.

With the benefit of hindsight it can be concluded that the company chose to spend a substantial part of its capital on plant systems unsuitable for the area. With the adequate capital available to them, they could well have constructed a bucket dredge which in all probability would have been more successful.

By 1902, the Company had spent approximately £11,000 on its plant at Tongio West, which together with the £14,000 spent on the water-race a total of £25,000, was well in excess of the amount of £15,000 that the company originally intended as a capital works investment.

PRODUCTION BY JIRNKEE COMPANY

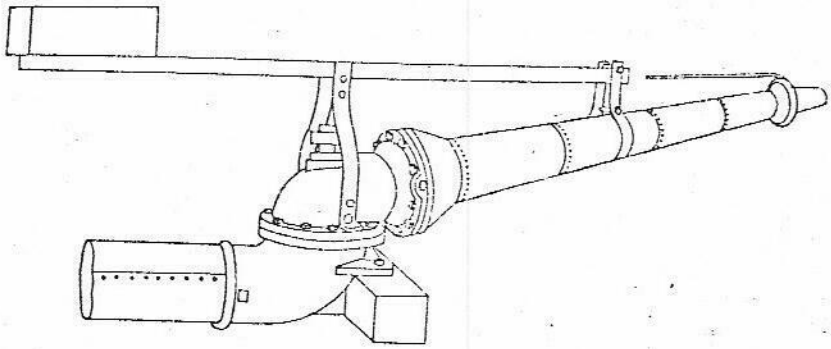
Although all plant and equipment was ready and apparently operational in January 1901, production could not commence until September of that year as there had until then been insufficient water in the race largely as a consequence of several collapses in the banks of the race along its 48 mile course.

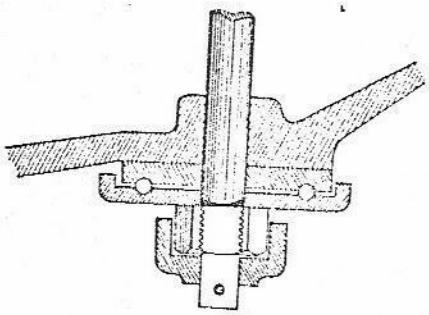
Whilst it was felt that the incidence of race wall collapse would reduce as the earth works settled down, it was also then first recognised that full capacity of the race was unlikely unless an additional branch was constructed near its commencement to pick up the more southern heads of the Wentworth River.

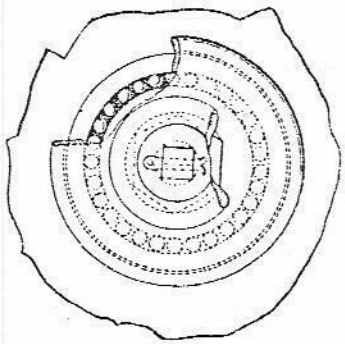
For operation of the hydraulicking nozzle and the jet elevator, a depth of sixteen inches of water was required in the race.

HYDRAULIC GIANT

DOUBLE JOINTED, BALL BEARING







This required supply was available for only short periods in 1901, 1902 and 1903 and even in 1904 and 1905 after the additional seven miles of branch race was cut, the race achieved adequate capacity for substantially less than half-time.

In September 1901, as noted earlier, the plant got into operation. For a very short period only it was able to work on three shifts per day.

In November 1901, Mr. Jonathan Lang, the then Manager or Managing Director who had presumably succeeded Mr. Boyle, died from injuries received as a consequence of being struck by a jet of water from the Giant hydraulicking nozzle. At the time, he was showing a party of visitors over the plant.

At the inquest into Mr. Lang's death, it was recommended that a safety fence be erected around the plant to keep people other than employees at least 70 feet from the nozzle.

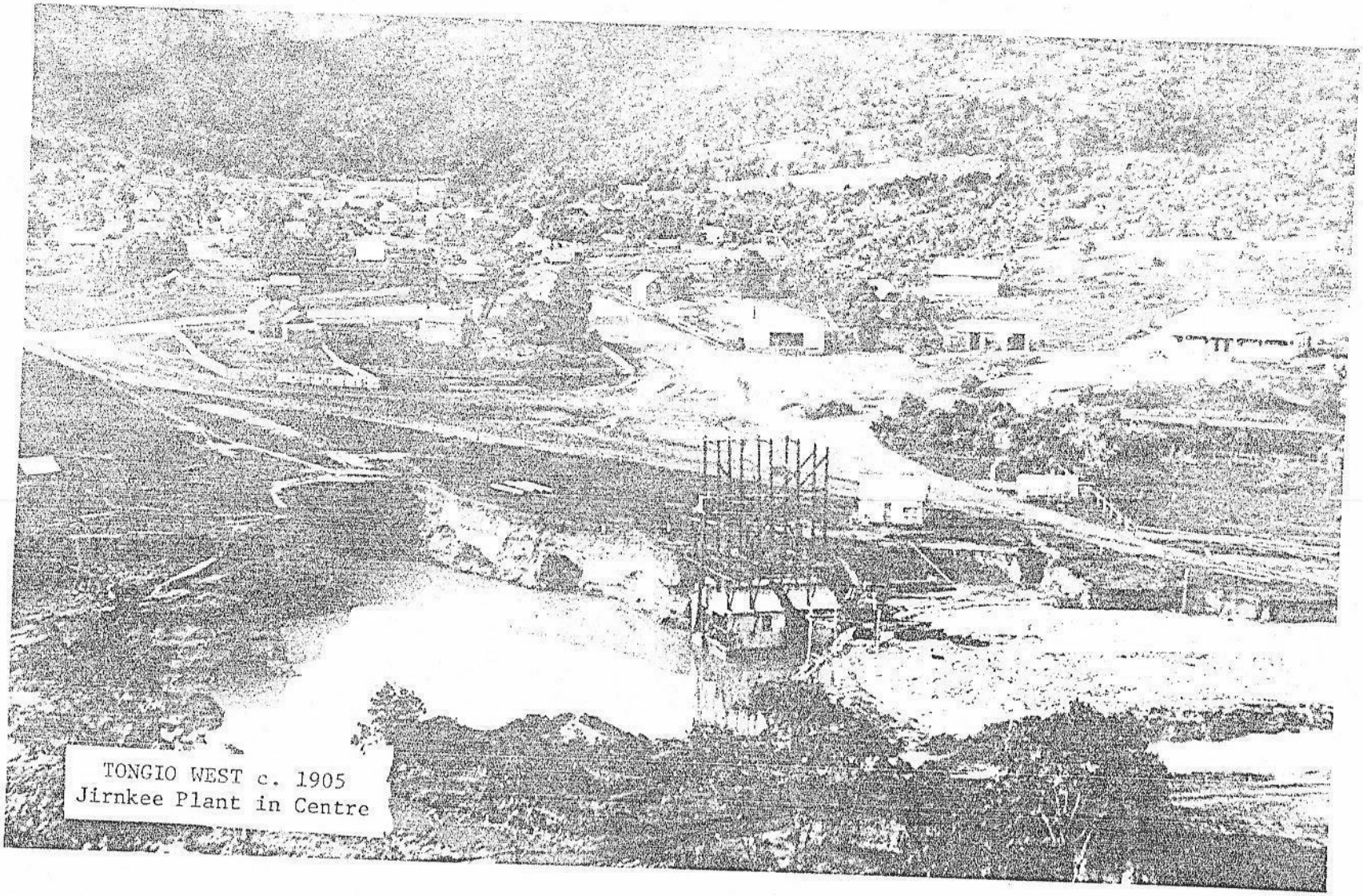
The Baron de Grandmaison returned to Tongio West after Mr. Lang's death to personally manage the operation for most of 1902.

As best as can be presently determined, the production record of the Jirnkee Company was:

Year	Weeks Worked	Throughput Cubic Yards	Production Ounces	Grade Grs/ Y.C.
1901	?	1,000	10.0	4.8
1902	?	19,360	215.8	5.4
1903	4	4,840	34.8	3.4
1904	21	60,500	301.7	2.4
1905	16	32,266	193.5	2.8
		117,966	755.8	3.1

There are some inconsistencies in recorded official returns, but the above assessment is likely to be of the correct order and to include for a number of nuggets that the company was fortunate enough to retain. The company, in common with other alluvial groups working ground with coarse gold, or quartz mines working ground with "jewellers' shops", would have suffered fairly significantly from pilfering of rich specimen pieces, an accepted practice in the industry and one that attracted no social stigma.

In 1902, the company obtained a nugget of 8½ ounces, one of the biggest ever found in the district and also one of a smaller size, 1 ounce 6 dwt.



TONGIO WEST c. 1905
Jirnkee Plant in Centre

Also in 1902, the company as an alluvial operator made an unusual discovery. Whilst operating in ground eleven feet deep, they exposed in the valley floor a highly mineralised reef two and one-half feet wide which assayed at 18 dwt. gold per ton.

After the return of the Baron, the operation at Tongio West was managed until cessation of activities in 1905, by J. Molyneux.

During 1903, 1904 and 1905 the company had employed whilst operational, between twenty and twenty-five men and in each year, as in earlier years the wages bill alone well exceeded the income from gold. In 1903 and 1904, their on site costs were £3,347 for wages and £102 for maintenance materials, whilst their income from gold was approximately £1,980.

A small additional income was received from the sale of water to quartz mining companies when the sluicing plant was not in operation but this would not have been sufficient to offset the company's fixed overheads let alone make any impression on the on-site operational short-fall.

The availability of water in the race was a challenge and enticement to nearby residents who would, on occasions, syphon supplies from it by hose, until discovered by the company's patrolman. Mr. Ed. McLaren had the unenviable job of patrol-man for the lower twenty miles of race.

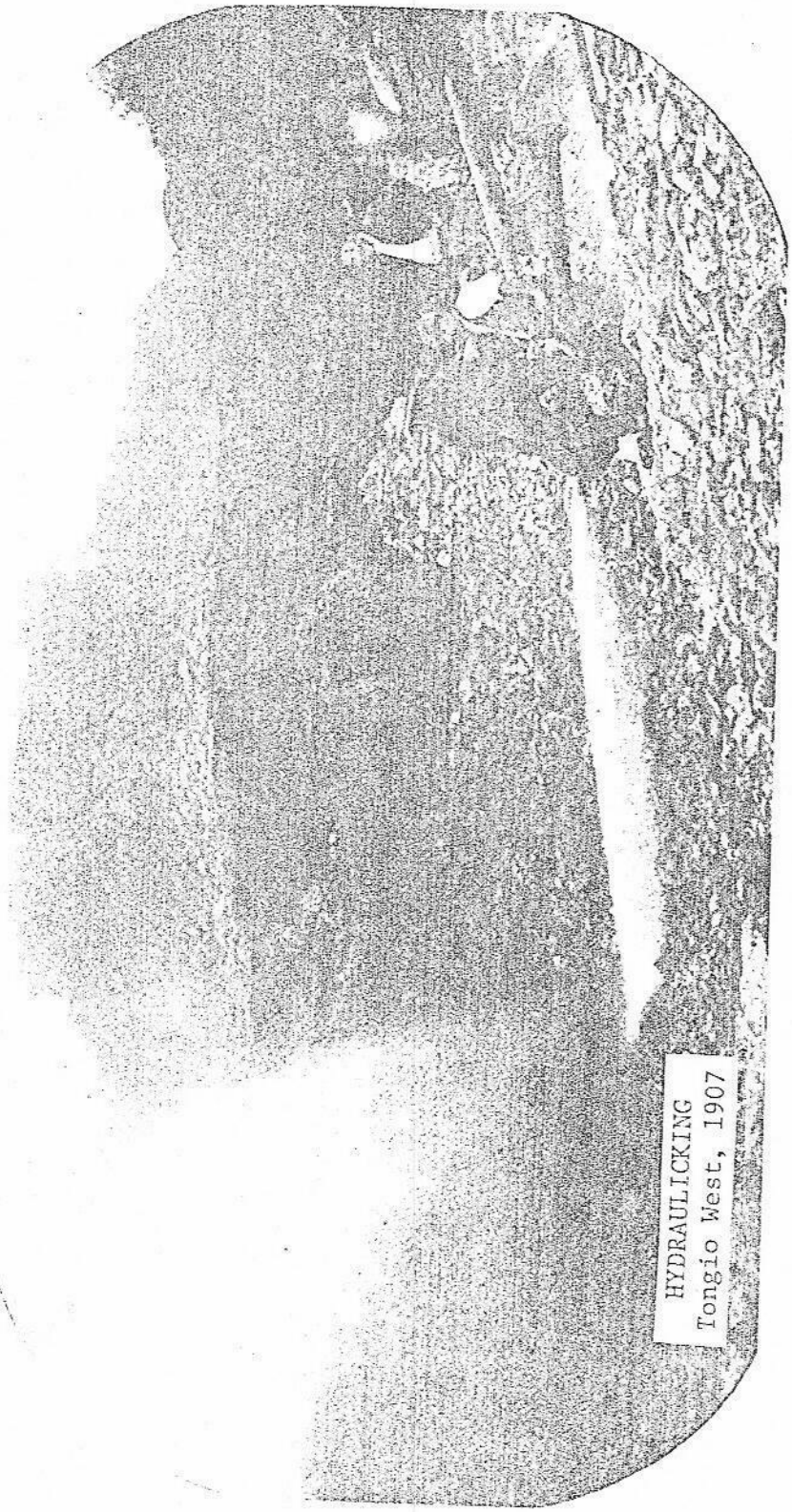
To cap all their misfortunes, in 1905 apart from a want of water for the greater part of the year, they entered particularly poor ground after running for sixteen weeks. That was the final straw.

Operations finally ceased towards the close of 1905. Although there were suggestions of re-opening operations after a capital reconstruction of the company and some modifications being made to the plant, this did not eventuate.

JIRNKEE HYDRAULIC SYNDICATE

On 22nd June, 1907, the Jirnkee Hydraulic Sydnicate N.L. was formed with a nominal capital of £5,000, in fifty shares of £100 each, and a paid up capital of £42 only. The shareholders included a number of people from Cassilis and Tongio.

They came into possession of the Jirnkee Company's leases, race and plant for which they obviously paid little or nothing.



HYDRAULICKING
Tongio West, 1907

In the latter half of 1908, Mr. Molyneux, the former manager of the Jirnkee Company's operations, retired to Tongio West to manage the Syndicate's programme.

The Syndicate had by then subscribed an additional £2,016 and with funds available and the assistance of four employees he put the plant in order and treated a trial parcel of 120 cubic yards for a return of 1 ounce 14 dwt., a grade of 6.9 grains per cubic yard. The trial was carried out without use of the jet elevator.

The Sydnicate and Mr. Molyneux apparently considered this trial to be satisfactory for a further £504 was subscribed. During 1909 they treated 8,500 cubic yards, using the pontoon and jet elevator, for a return of 57 ounces 6 dwts, a grade of 3.2 grains per cubic yard. Eleven men, including Mr. Molyneux were employed.

The income from gold fell well short of the on-site wages and maintenance bill and the Sydnicate ceased operations at the close of 1909, effectively writing Finis to the saga of the Jirnkee.

OTHER PARTIES AND THE TONGIO DREDGE

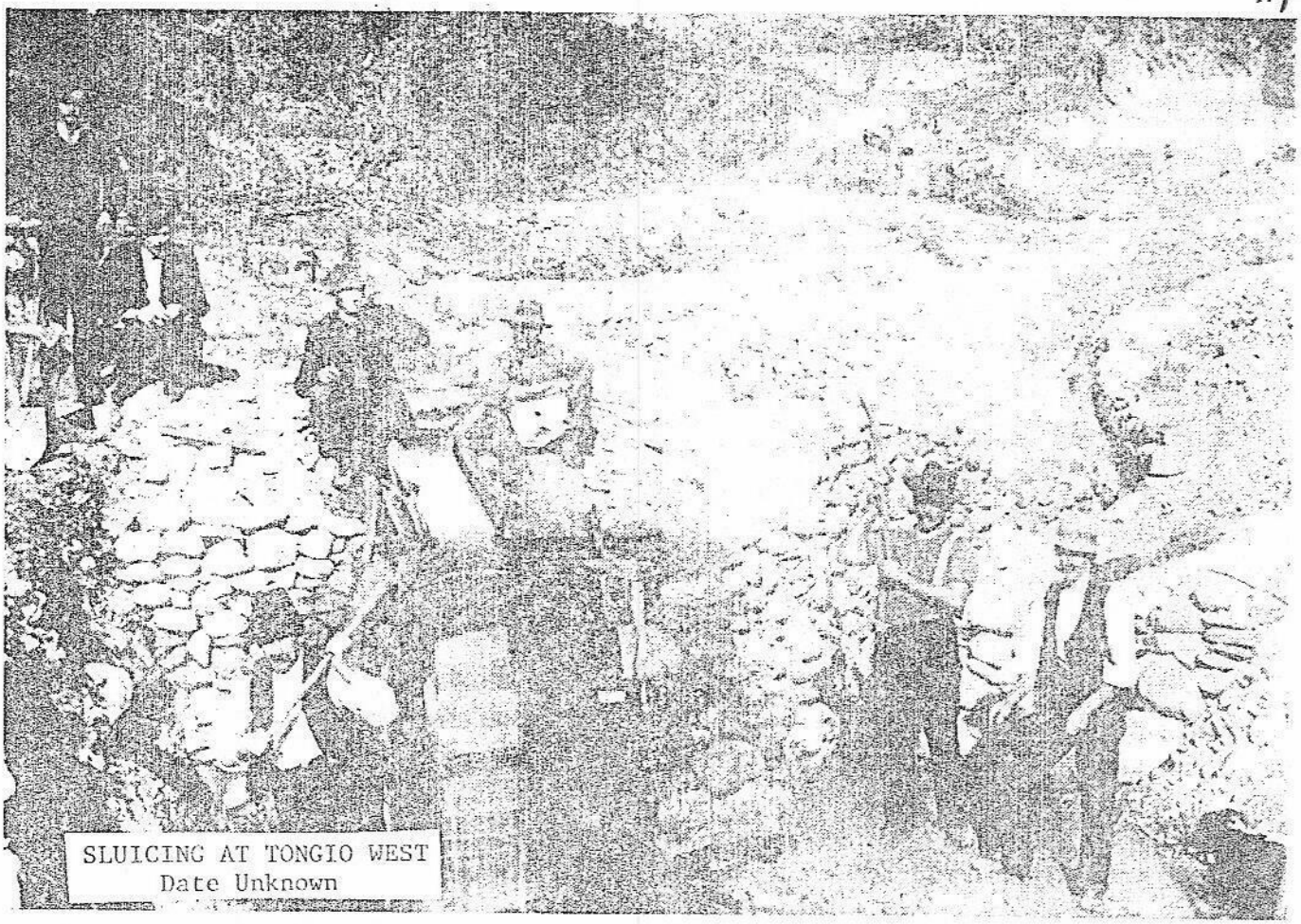
Throughout the life spans of the Working Miners Company, the Jirnkee Company and the Jirnkee Syndicate, many small co-operative parties worked the alluvial beds of Swifts and Grays Creek. Almost without exception their production has gone unrecorded.

During 1910 and 1911, the last of the more sizeable alluvial operations of the area took shape.

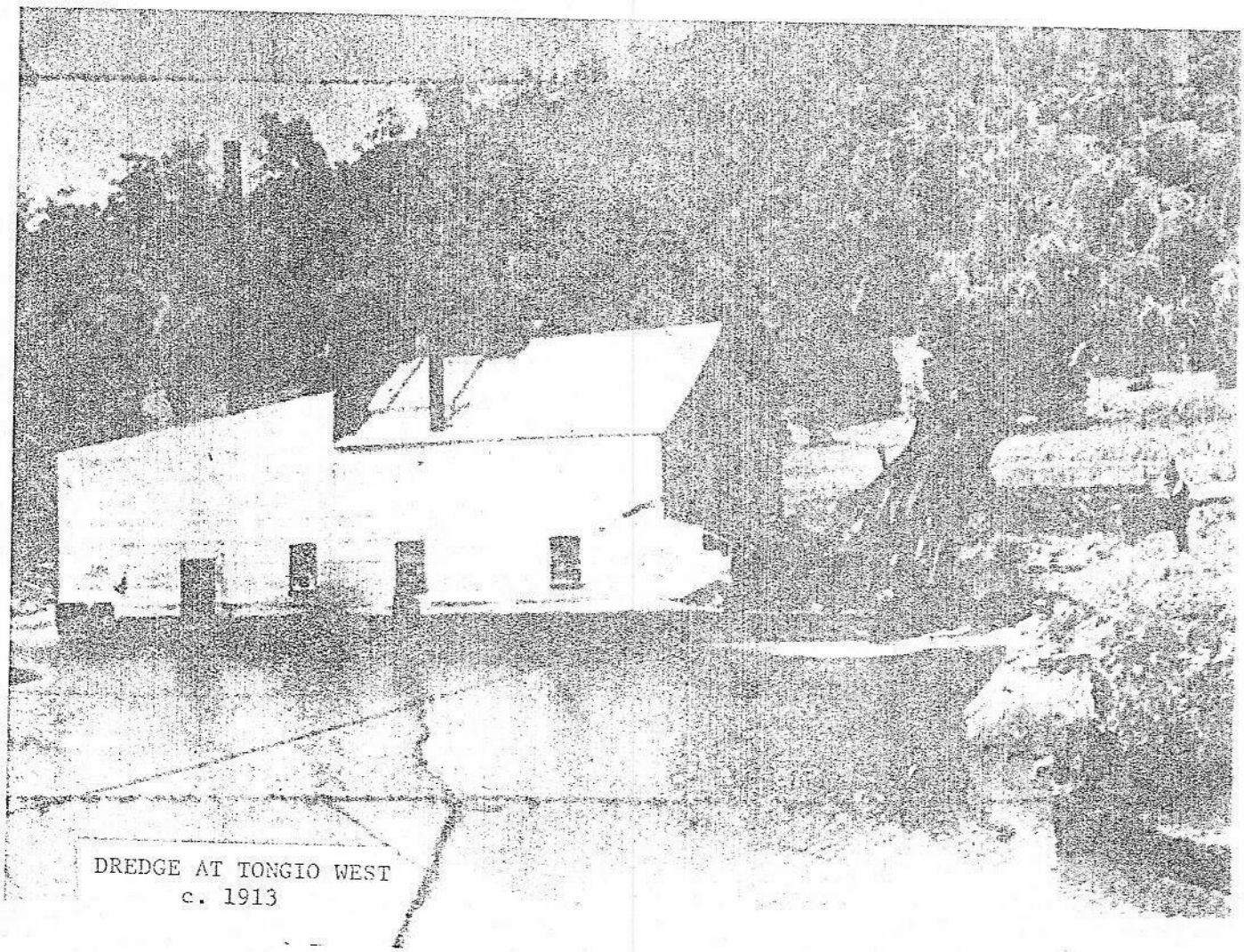
The Tongio Gold Dredging Company was formed with a nominal capital of £7,000 in £1 shares of which the full amount was finally called up. They constructed a bucket dredge and associated plant of 120 cubic yards per hour capacity for a cost of £5,131 to work 246 acres of ground in Swifts Creek upstream from Chinaman's Crossing and along to Powers Creek and also Grays Creek upstream from the junction with Swifts Creek at Tongio West.

Operations of the Tongio Gold Dredge commenced in January 1912, and from then until 1915 they produced 3,629 ounces 6 dwt. of gold from dredging almost 21 acres of ground to an average depth of 34 feet. Dividends paid were £875 and the average yield in 1915 as 2.5 grains per cubic yard.

The year 1915 had been very dry and as a consequence the dredge had been closed down for six months. The effects of this set-back ran through in to 1916, and in that year the dredge treated only one-half acre of ground for a return of 152 ounces of gold.



SLUICING AT TONGIO WEST
Date Unknown



DREDGE AT TONGIO WEST
c. 1913

In 1917 the Company were more fortunate and treated six acres for 1,194 ounces. During the following year the Company cleared out and repaired the Jirnkee Water Race, thus considerably improving their supply of water.

The dredge continued operations until closure in 1923, by which time 61 acres in all had been treated for a return of 10,715 ounces of gold. Total dividends during the life of the operation were £1,575.

Keith Fairweather in his book "Time to Remember" recounts a number of recollections of the dredge and reports that it was broken up as scrap metal by a Mr. Wheelhouse in the 1930's. Some pieces remain to this day.

THE MOUNT HEPBURN-KING CASSILIS MINE

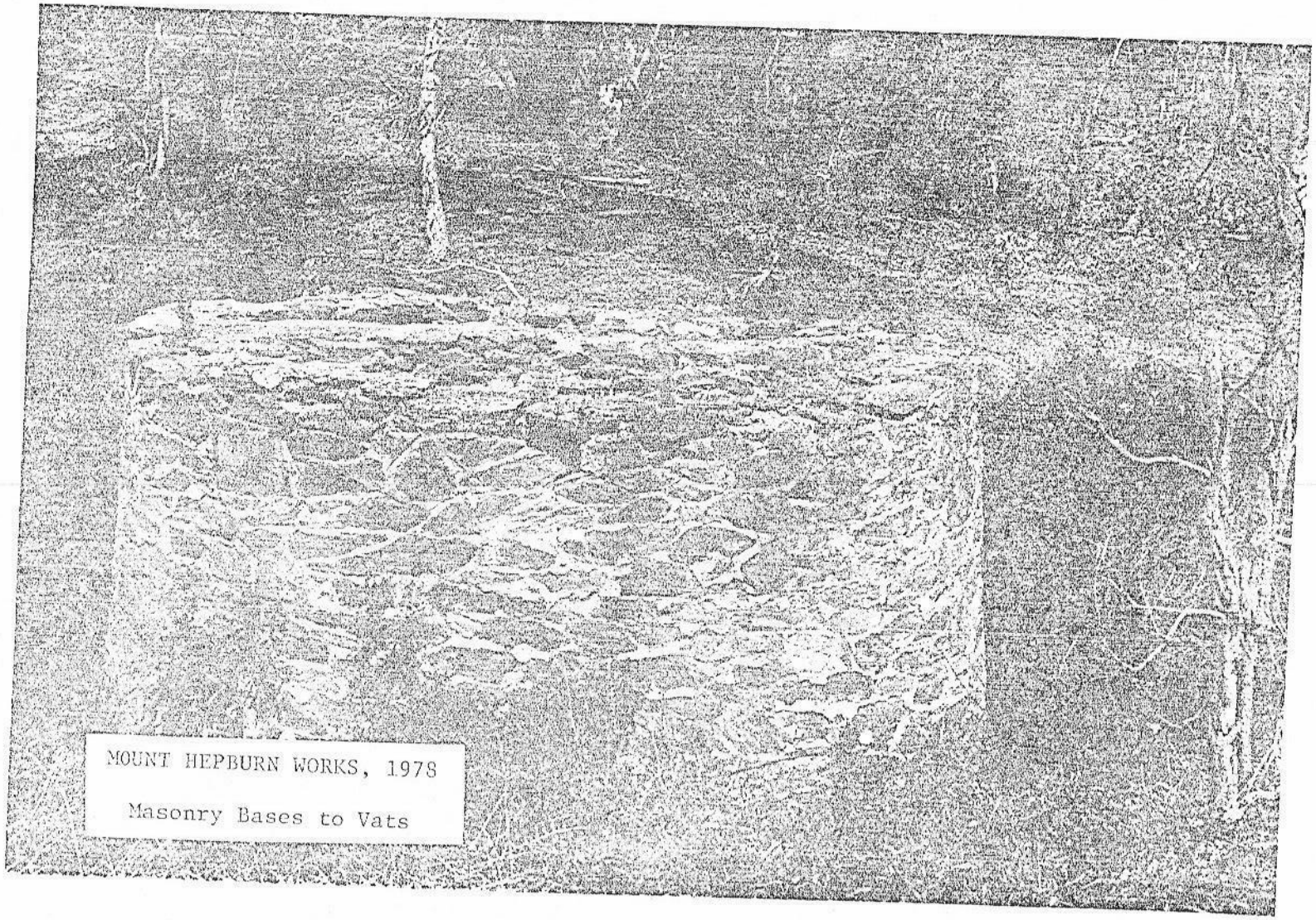
AND

TREATMENT WORKS

An historical review and appreciation of the Mount Hepburn-King Cassilis Mine and its associated treatment works, at Tongio West.

****

John B. Griffiths
Axedale Mining Co. Pty. Ltd.



MOUNT HEPBURN WORKS, 1978

Masonry Bases to Vats

INTRODUCTION

What have appeared to be potentially valuable auriferous sulphide lodes at the Mount Hepburn - King Cassilis mine complex, have attracted the attention and investment of a great number of parties over the years from the original discovery, in perhaps 1858, until the present time.

The metallurgy of the deposits resulted in varying methods of ore reduction and treatment being undertaken. These have included stamp battery crushing and straightforward table amalgamation, fine grinding by an early ball mill variation together with amalgamation, stamp battery and cyanidation with and without furnace,desulphurisation, fine grinding and cyanidation with and without a furnace stamp battery and gravity concentration and finally milling and smelting.

Apart from the mill and furnace of the present leaseholder, John D. Avery, interesting relics and constructions related to earlier treatment works are present at the site.

EARLY REEFING

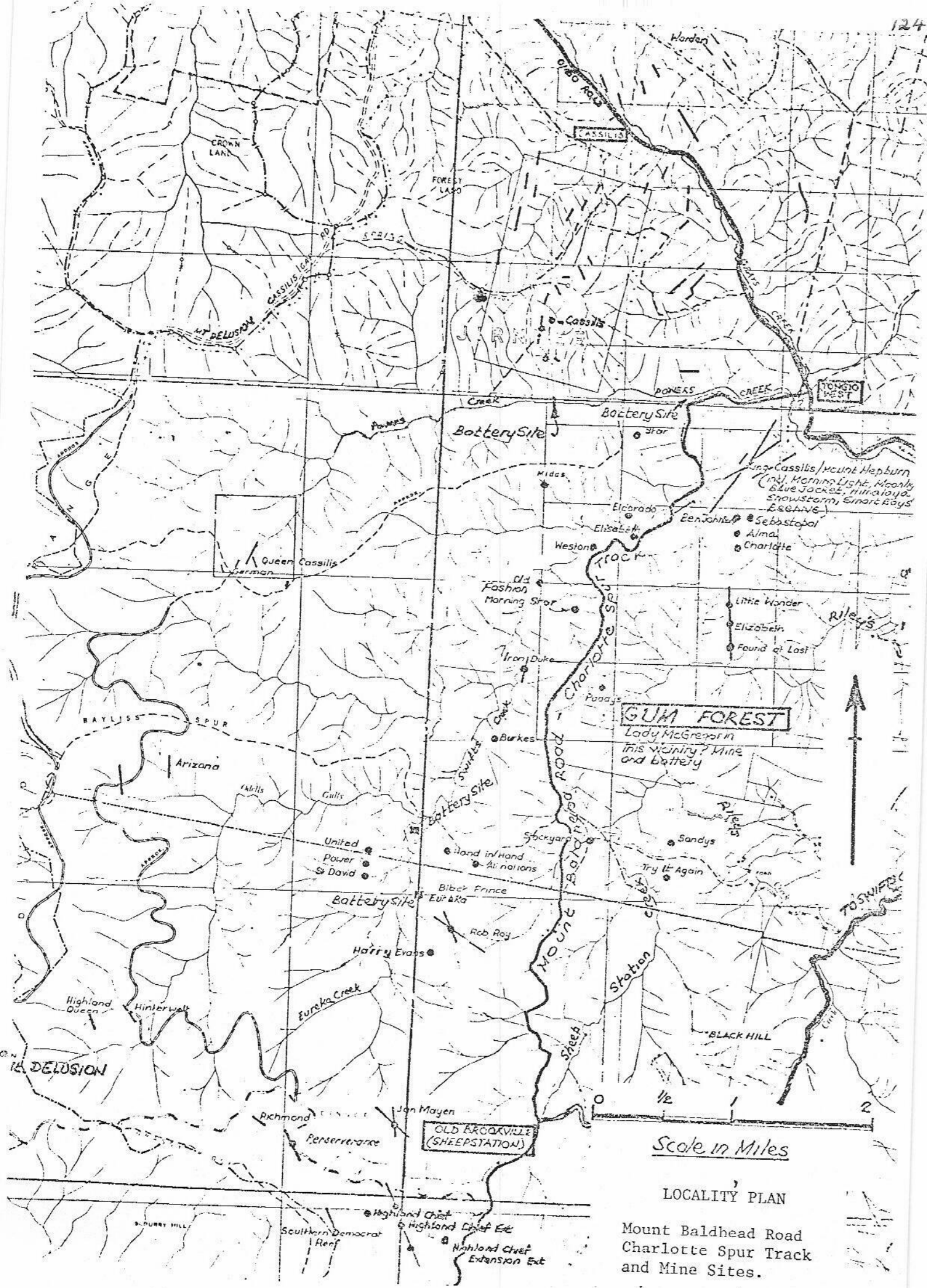
As has been noted in the report on the Charlotte Spur, the first auriferous reef discovered in the region could well have been made by William Power in 1858. The discovery was quite possibly his Morning Light prospect.

The Morning Light reef was situated only some ten to fifteen chains south of Power's hut, which was situated not far from the present day access into the Mount Hepburn - King Cassilis workings on the south side of Swifts Creek just above its junction with Grays Creek at Tongio West. The reef approximates the position of what many years later was to be known as the Beehive lease which was to form part of the Mount Hepburn - King Cassilis mines.

On 28th May, 1866, Lease No. 591 Beechworth of an area a little over 24 acres was granted to William Power, T.W. Cooper, Zepherim Champagne, Daniel Egan and Thomas Easton, operating as the Morning Light Quartz Mining Company.

Also over and in the vicinity of the property to be later known as the Mount Hepburn - King Cassilis mines other leases were granted in 1866. They were

- No. 590 of 14th May, 1866, with an area approaching 25 acres, granted to John King, G.B. Hamilton and E.D. Fitzgerald operating as the Himalaya Quartz Crushing Company, and approximating in position what some twenty-five years later was to be called the Hepburn Lease.



LOCALITY PLAN

Mount Baldhead Road
Charlotte Spur Track
and Mine Sites.

- No. 594 of 23rd May, 1866, with again an area approaching 25 acres, granted to Thomas Easton, T.W. Cooper, Ben Johnson, William Jack and Daniel Eagan operating as the Moonlight Quartz Mining Company, and situated to the west of the Morning Light lease of William Power.

- No. 658 of 28th May, 1866 with an area of a little more than 19 acres, granted to John Thomas Reid, John Hodgson, Charles Hodgson, Ben Johnson and Robert Crofts operating as the Blue Jacket Quartz Mining Company, and situated just to the south-west of the Morning Light lease.

Power himself was a well known prospector in the Tongio West region for a great many years, holding claims or leases not only there, but also on the Dargo, at Omeo and in the higher reaches of the Swifts Creek in the Gum Forest. Hamilton and Fitzgerald were amongst the first operating at Dry Hill on what are now known as the Oriental Claims and then as the Pioneer, and were the first to the writer's knowledge to hold a mining lease at Omeo, No. 534 of 4th January 1866 on Dry Hill.

Champagne again was one of the first at Dry Hill and subsequently became a proprietor of the Oriental Company. Jack was the proprietor of the first granted lease on Swifts Creek, the Star, No. 592 granted on 12th April 1866, and was subsequently to be the proprietor of the Golden Age Hotel at Omeo, and also joint holder of the Bundarah Run. He was elected a Councillor at the first election for the Shire of Omeo and remained so for four years during which time the council meetings were held in his hotel.

John King was a member of Alfred Howitt's Gippsland Exploration Party in 1860, who are credited with discovering the first gold at Crooked River. John (Whisky Tom) Reid was the husband of Charlotte Reid who is credited with discovering the first reef on Charlotte Spur and after whom the spur is named.

Thomas Easton was variously shareholder, secretary, manager, working miner, consultant and entrepreneur on a number of mines throughout the district. He was manager of the Eureka at Gum Forest, the most active of the early mining companies on the Swifts Creek reefing field. He had for some time been assistant to William Phibbs, the Mining Registrar for the Omeo region, and from 1873 to 1903 was to be Shire Secretary at Omeo.

In May 1866, Thomas Easton as Manager formed the Morning Light, Moonlight and Blue Jacket Amalgamated Quartz Mining Company with a nominal capital of £3,600 to operate the Leases 591, 594 and 658. The company did not include William Power, the apparent discoverer of the prospect and it is presumed that he in particular sold out and went to work on his prospect, the Sunshine at Upper Dargo.

It is interesting to ponder upon a press statement in December, 1866 to the effect that copper ore had been found at Swifts Creek. Where was it found? Was it from the reefs at the Himalaya - Moonlight - Morning Light - Blue Jacket complex or was it from one of the small copper veins we know exist in Long Gulley? Perhaps the last, but at that time all the action was along the Swifts Creek/Charlotte Spur area.

As explained in the report upon the Charlotte Spur, the shareholders of a number of the Swifts Creek leases prevailed upon a Melbourne Group to establish a stamp battery on Swifts Creek at the foot of the Charlotte Spur, near the junction of Swifts Creek and Powers Creek. The arrangement was for this enterprise to crush for the proprietors of six leases which, it is believed, included the Himalaya and the Morning Light, Moonlight and Blue Jacket Amalgamated.

Finally, after the liquidation of the original Group, the Omeo Quartz Crushing and Mining Company, and the taking over of its assets by a new company, the Swifts Creek Crushing and Mining Company, a fifteen head steam powered battery was in operation by October 1867.

Co-incidentally by this time, the leases of the Moonlight, Morning Light and most probably the Blue Jacket had been voided for non-payment of rents. In July 1868, the Himalaya lease was also voided. The prime sections of reef within these now voided lease areas were then taken up and held under claims.

In 1871, the ground held by the Himalaya Company, by then known as the Snowstorm, and probably that of the Amalgamated Company were taken up by the newly formed Black Prince Gold Mining & Crushing Company who had also purchased the Stamp battery and taken up the ground of the Erueka Company in the Gum Forest. In 1872, operation of the battery and the reefs at the Snowstorm (ex. Himalaya etc), were transferred to a subsidiary, the Black Prince Extended Company.

Crushings from the Snowstorm (ex Himalaya etc) were poor and the cost of ore cartage from the parent Company's leases on the Eureka Reef in the Gum Forest was prohibitive. As a consequence the battery was moved in 1873 from its valley site, a relatively convenient location for use by those at the Snowstorm, to the top of the spur near the Eureka reef. Not remarkably, no crushings of consequence are recorded again from the vicinity of the later Mount Hepburn - King Cassilis reef group for over fifteen years.

EARLY CRUSHINGS

Excluding three early crushings described as Powers Claim which might well be from his claim on the west side of Swifts Creek somewhat opposite the Eureka Reef in the Gum Forest, the only crushings positively identified as coming from the area of the later Mount Hepburn - King Cassilis mine area are:

	Year	Name	Tons	Yield (ozs) Free Gold	Grade (Dwts/Ton) Free Gold
	1868	Blue Jacket	2.5	3.15	25.26
	1869	Snowstorm	68.0	47.90	14.08
(*)	1871	Snowstorm	15.0	1.13	1.5
(**)	1872	Himalaya	144.0	43.52	6.04
(**)	1872	Snowstorm	25.5	7.55	5.92
			255.0	103.25	8.10

(*) Recorded as Black Prince Extended
(**) Plus blanketings and pyrites recovered.

It will be subsequently observed that this average recovered grade of free gold is consistent with that recovered by the later Mount Hepburn enterprise.

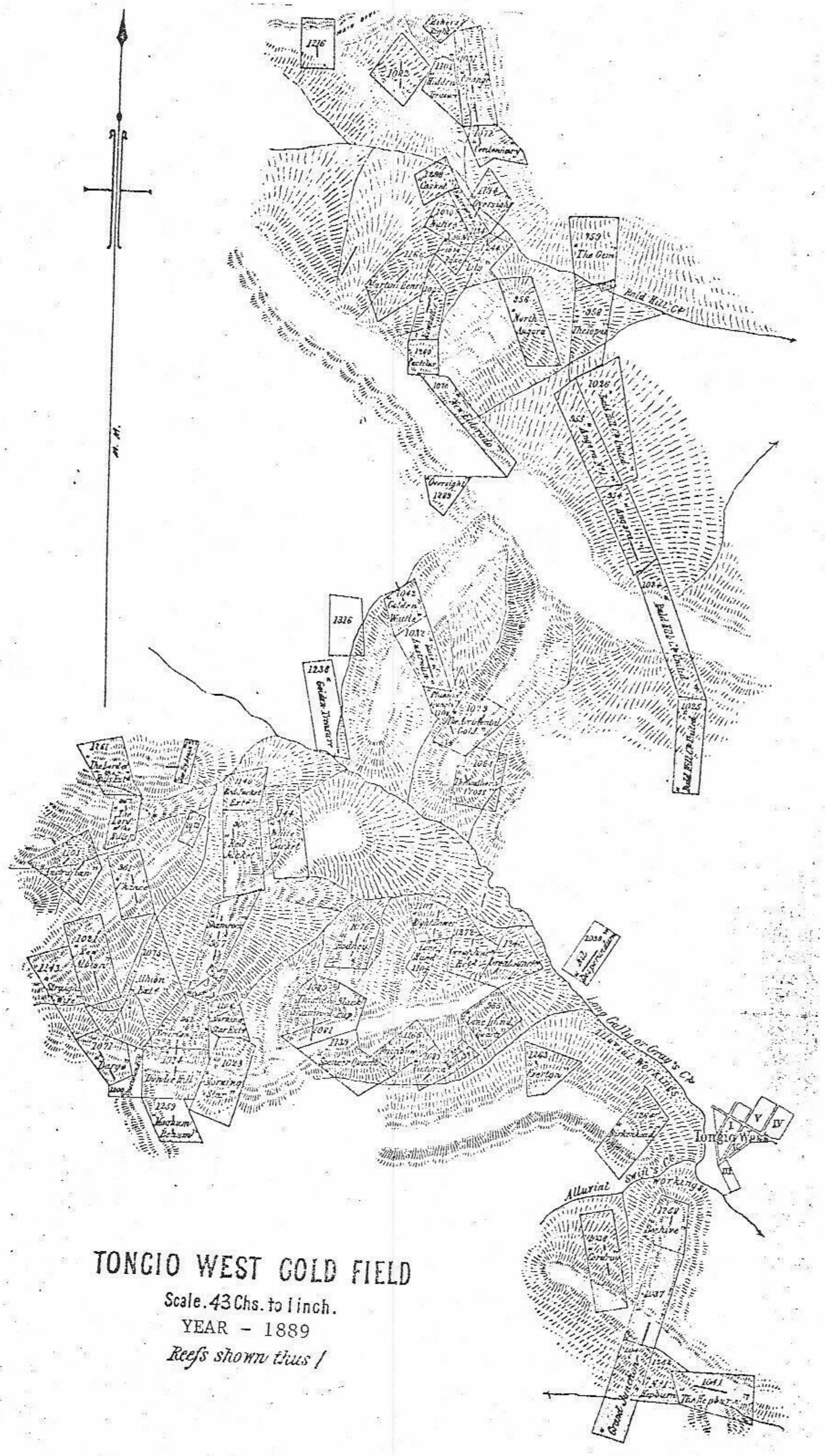
LONG GULLY TAKES SHAPE

In March 1885, Mr. Odell the then Mining Registrar at Omeo reported the crushing, at Peter Forsyth's Lady McGregor Battery in the Gum Forest, of parcels of stone for George Forsyth & Party and for Robert Howard & Edward McLaren. Returns were between four and five ounces of free gold per ton and the stone was reported to have come from Long Gully and the range between there and Bald Hill Creek.

This may fairly be considered the beginning of the important phase of quartz mining in the Cassilis area, which was to result in the extraordinarily rich finds on Markey's Line and elsewhere, the development of increasingly comprehensive mills and treatment works in the region and the establishment of that famous mine, the Cassilis in Powers Gully, which finally ceased its operations in 1916.

The finds of the mid-1880's and those for some four years to come were operated and tested by carting the ore up to fifteen miles, to Peter Forsyth's battery. By September, 1887, forty claims had been registered on Bald Hill Creek and at Long Gully where the town of Cassilis was to be established. The trial crushings for these were returning between two and eight ounces of free gold per ton.

Also in September 1887, James Stirling, the later Government Geologist and then the successor to Mr. Odell as Mining Registrar, was recommending having a large area of land between Bald Hill Creek, Long Gully and Swifts Creek Junction withdrawn from selection, in order to facilitate future mining operations. The potential of the area was recognised. The Howard, Dawson and Matthews claim at Bald Hill Creek was sold to a Melbourne Syndicate for £1,000 and a company, known as the Bald Hill Creek United Quartz Mining Company with Edward A. Ball as Manager, was established to work the property and erect a battery.



TONGIO WEST GOLD FIELD

Scale. 43 Chs. to 1 inch.

YEAR – 1889

Reefs shown thus /

At Long Gully, George Smart and Edward Ball in partnership had purchased three claims for themselves and their syndicate for £2,000 and were intending to erect a mill there also.

By the first quarter of 1880, the Bald Hill Creek Company had their first crushing of 90 tons for an average return of 2¾ ozs. of free gold per ton. and Messrs. Ball and Smart had their plant on site, ready for erection. Numerous additional claims as well as lease applications were being registered.

Almost seventy leases were granted in the area by early 1889. The plant to be erected at Long Gully by Messrs. Ball & Smart was of a novel kind, a pulveriser of the ball mill type, instead of a stamp battery, together with a stone breaker, chilean mill and Watson & Denny pans. Edward Ball in particular was always keen to try new ideas.

Unfortunately, by September 1888, Ball & Smart's new mill had been proven a failure and thus until they erected new plant at Long Gully, the miners there still had to take their ore the many miles to Peter Forsyth's battery. Mr. Ball and Mr. Smart decided to go their separate ways at Long Gully, Mr. Smart retaining the useable components of their failed plant.

Before the middle of 1889, George Smart had his battery in operation but his death in that same year temporarily retarded progress on his mine properties. Concurrently, the Rose of Australia Syndicate had their battery in operation, charging the public ten shillings per ton for treatment, and the Never-Can-Tell Company had their's going shortly after.

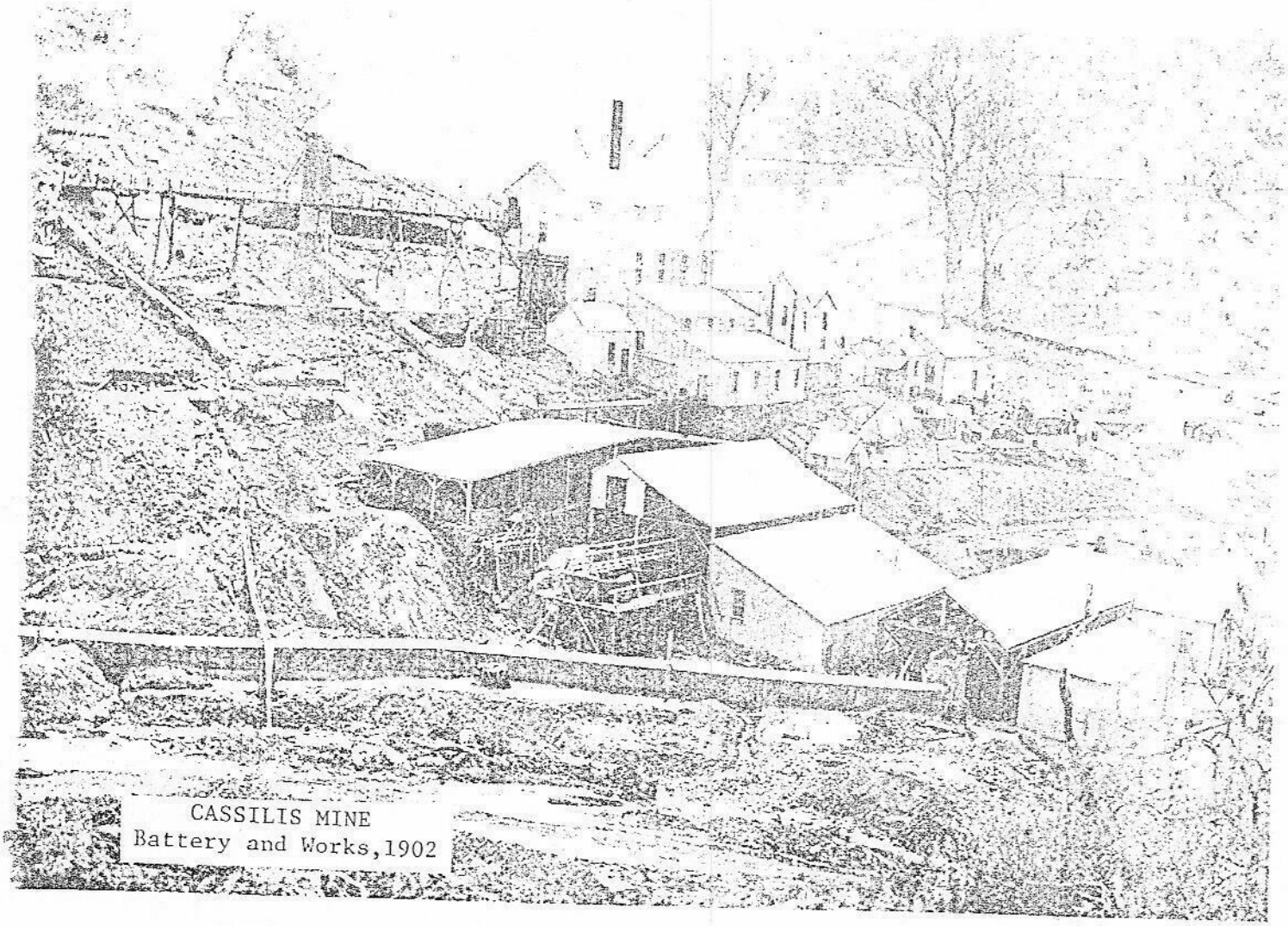
In 1889, the Bald Hill Company were the first to roast their ore, with considerably improved results.

Messrs. Ryan Brothers purchased the by then named Brave George Battery from the executors of the late George Smart for £1,100. This battery was situated at Tongio West, just downstream from the junction of Swifts and Grays Creek, was of ten heads and was fitted with ordinary amalgamation plates, the Watson and Denny Pans originally provided for the Ball & Smart plant that failed and with blanket tables.

Ryan Brothers Brave George Battery was a first rate investment and for many years was to be the most successful public battery in the Long Gully - Tongio West Goldfield, treating thousands of tons for its clients. Its principal competition was to be Ekberg & McCulloch's Hope Battery and Chlorination works at Cassilis which was bought and updated by the Warden Company in 1896.

This was not the Ryan Brothers only good investment. They had a claim on the Markey Reef from which they obtained quite fabulous returns, the first crushing of 101 tons, the result of two mens work for eight months, returning 557 ounces of gold, whilst the next of 129 tons returned 452 ounces.

THE WARDEN CHLORINATION WORKS
Cassilis c. 1898



CASSILIS MINE
Battery and Works, 1902

In 1890, the reef upon which the Cassilis Company were to work was discovered by R. Howard and was worked by a local party until 1898 when it was purchased by the newly formed Cassilis Company. The Cassilis Gold Mining Company were to obtain during the course of their operation from 1898 to 1916, 93,385 ounces of gold from 114,044 tons of ore, an average recovered grade of 16.4 dwts. per ton.

The Warden Company and New Warden Company which were to operate ground on the Markey's and Endeavour Lines of reef from the mid 1890's until 1910 produced 5,338 ounces from approximately 4,150 tons of ore, an average recovered grade of 1 ounce 5.7 dwts. per ton. The Company, as noted earlier, also obtained income from treatment of ores for the public at its Battery and Chlorination works at Cassilis.

EDWARD BALL AND THE MOUNT HEPBURN

During 1887, Edward Abraham Ball and his partner George Smart employed a prospector to search out suitable prospects for development in the Long Gully - Tongio West Goldfield.

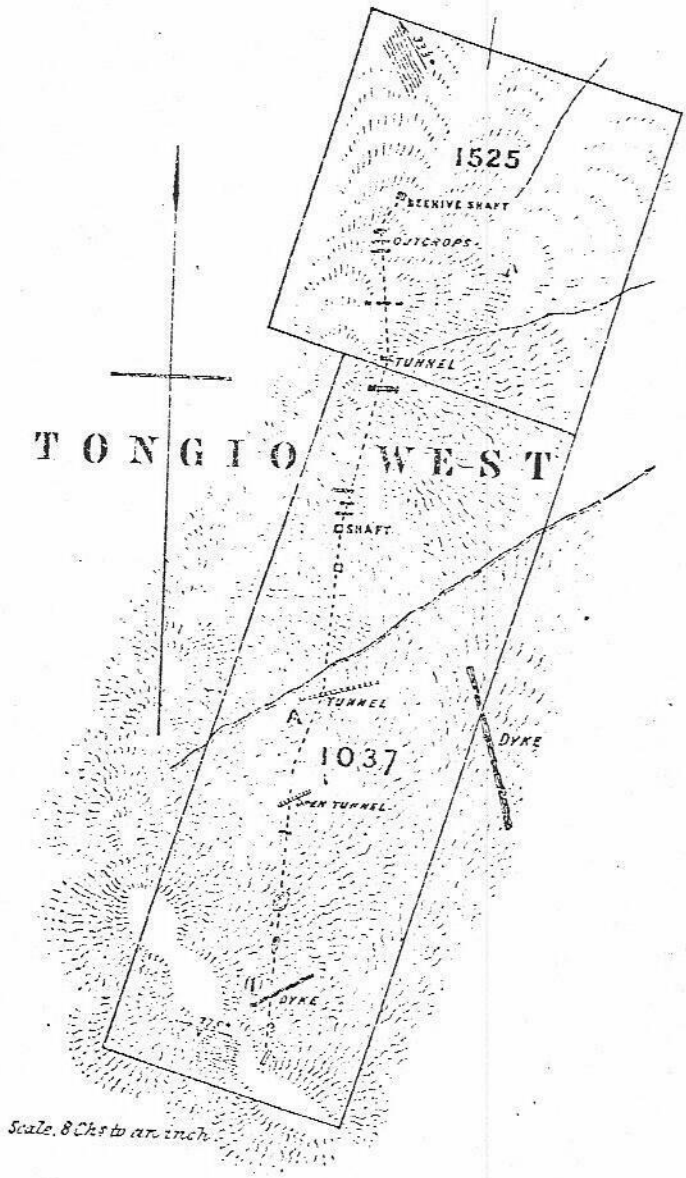
The prospector, whose name is unfortunately unknown, was attracted to the workings of the former Moonlight, Morning Light, Blue Jacket and Himalaya Companies, whose prospects it will be recalled had been abandoned in the early 1870's after some 255 tons had been treated for an average return of 8.1 dwts. of free gold per ton.

Ball and Smart were taken with the apparent size and potential of these prospects, applied for leases and on 15th October 1888, were granted Gold Mining Lease No. 1037 Gippsland, the Smart Boys, of 30 Acres and G.M.L. 1038 Gippsland, the Corduroy just to the west, also of 30 acres. Subsequently they were granted G.M.L. 1041, the Hepburn, of a little over 29 acres on 3rd December, 1888; this was situated a few chains south-east of Lease 1037 but was abandoned by 1890.

Henry Foster was granted G.M.L. 1040, the Grand Junction, of 30 acres, also on 3rd December 1888. This lease was a southward continuation of the Smart Boys and again it was also abandoned by 1890.

By mid-1889, the reef on the Smart Boys was claimed to have been proven to be 45 feet wide and had assumed the position of principal prospect. Following the death of George Smart in 1889, Edward Ball apparently purchased that interest in the joint leases not already owned by him, from the executors of George Smart.

Trial crushings from the prospects were carried out either at Ryan Brothers Brave George battery which had commenced operations under the management of George Smart earlier in 1889 just across the Swifts Creek from the Smart Boys lease, or at the Rose of Australia Syndicate battery in Long Gully in which Ball had a substantial interest.


1525
BEEHIVE SHAFT
OUTCROPS
TUNNEL
TONGIO WEST
SHAFT
TUNNEL
1037
DYKE
DYKE
Scale, 8 Chs to an inch

It might be remarked here that by 1890, Edward Ball had interests in his own name in eight leases in Gippsland, at Tongio West, Long Gully, Rileys Creek, Omeo and Neerim, apart from interests under others or company names, for example the Rose of Australia Syndicate. However, those at Tongio West, at what was to be known as the Mount Hepburn were to be his principal interest or passion. He was ably assisted by his son, E.A. Ball Junior and also Edward G. Ball presumed a son and certainly a relative, both of whom exhibited the spirit of the older E.A. being involved in a great number of enterprises both alluvial and quartz.

By January 1893, the ground of the Beehive Lease formerly No. 1258 and immediately north of the Smart Boys Lease No. 1037, was also owned by Edward Ball. It was re-issued as Lease No. 1525. Trial crushings of 9 tons for 10 ounces 8 dwts. and 9 tons for 8 ounces 10 dwts. were carried out that month at the Rose of Australia and Bald Hills United batteries respectively. Ball had associations with both batteries.

In April 1893, he applied for another lease adjacent to the Hepburn and called it the Mount Hepburn South.

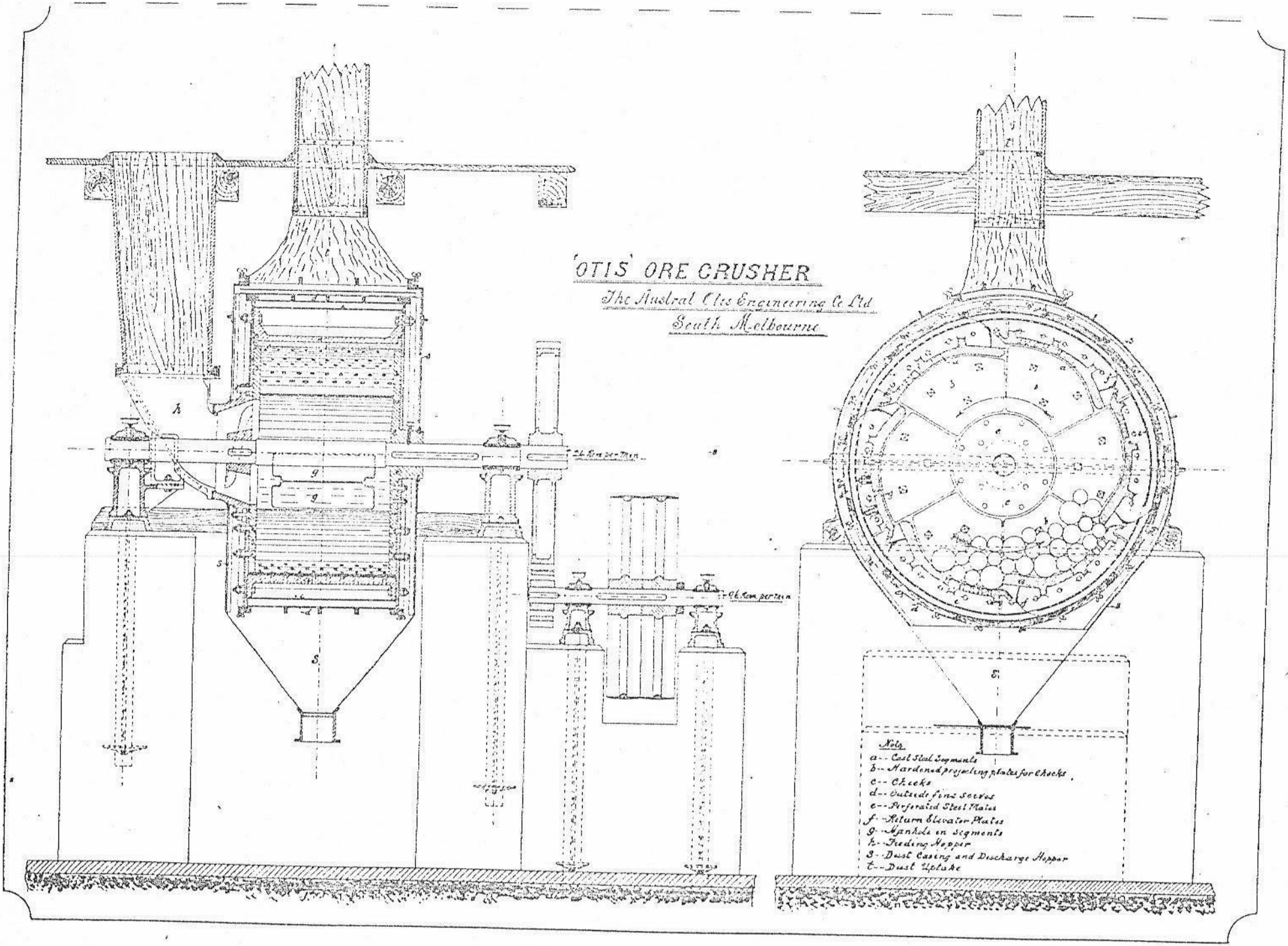
In April and May 1893, "Ball's Big Reef" as it was then known, on Lease No. 1037 by then called the Mount Hepburn had its first major bulk test. Some 200 tons of ore were crushed at Ryans battery for a yield of 164 ounces of free gold, a recovered grade of 16.4 dwts. per ton.

The ore had been taken from a part of the reef 18 feet wide. Many thousands of tons of ore were claimed to be available and Ball had just recently decided to intall an Otis Crusher, a ball mill manufactured to a German design by Austral Otis Engineering Co. Ltd. of South Melbourne. Austral Otis were manufacturing a number of these mills for installation throughout Australia and a great number of German manufacture were operating elsewhere.

With knowledge of the earlier fiasco, when Ball with George Smart had failed with an earlier design of similar form, there was some surprise and cynicism expressed at this further venture into relatively unknown reduction methods. Ball's response was that the Otis machine had greater output per horsepower than any other crushing means and further it was already an accepted success elsewhere.

By October 1893, the Otis Crusher Size No. 2, was installed, tramways complete, and ready for production use. The Otis Crusher had cost about £450 ex works.

In the interim period between May and October, Ryan Brothers Brave George battery across Swifts Creek had been fairly constantly operating five heads on Mount Hepburn stone alone, the other five heads being used for other public crushings. In July, it was reported that a run of 212 tons of Mount Hepburn Stone had returned 9 dwts. per ton and in October, 115 tons returned 7.65 dwts per ton.


'OTIS' ORE CRUSHER
The Austral Otis Engineering Co Ltd
South Melbourne
Note
a -- Cast Steel Segments
b -- Hardened projecting plates for Checks
c -- Checks
d -- Outside fine Screen
e -- Perforated Steel Plates
f -- Return Elevator Plates
g -- Manhole in segments
h -- Feeding Hopper
S -- Dust Casing and Discharge Hopper
t -- Dust Uptake

It is estimated that between April and October, when the Otis Crusher commenced operation, approximately 1,000 tons of Mount Hepburn ore was crushed at Ryan's Battery.

At that time the mine was working on a lens of reef 40 to 60 feet wide, the ore being broken from a stope open to the sky, 125 feet high, 80 feet long and 40 feet wide.

In early November 1893, the first clean-up of 96 tons put through the Otis Crusher yielded at the rate of 8.9 dwts per ton which, considering that no gold saving appliance were used with the crusher other than amalgamating tables, may be reckoned a very reasonable performance.

The crusher was mounted in the centre of a rather spacious building, about 2 feet 6 inches off the floor on a framing of six to eight inch oregon timbers, though more normally one would have expected it to be mounted on either masonry piers or a steel framework.

The machine, which is illustrated on the diagram included herewith, revolved at 25 revolutions per minute, had an output of one to one and one-half tons per hour depending upon the nature of the ore and the mesh size used, which could range from 1,600 to 5,000 holes per square inch. At the Mount Hepburn the mesh selected was 3,600 per square inch and throughput might be estimated at a little more than one ton per hour.

Ore to the mill was provided via a chute and an incline tramway from the workings. The crusher was driven by a sixteen horsepower Marshall Sons and Co., portable steam engine with double 10½ inch cylinders, and water was provided by a Tangye pump from a well sunk from a drive put in under the level of the mill. Gold was recovered by simple amalgamation only.

The delivery outlet on the Otis crusher had been lengthened and the crushed product was delivered first to a distributing box and from there on to movable copper plates 12 inches wide by 4 feet, set across the main amalgamating tables, fitted one on each side of the crusher.

From these plates it passed through two mercury wells and then on to the first main table, eight feet by four feet sheeted in copper, then through three mercury wells and on to a further copper sheeted table eight feet by four feet. Lastly the material could pass over a short blanket table with two strakes but this appears to have not been consistently used.

On a visit to the mine in late October 1893, shortly after the Otis crusher was in productive operation, Henry Rosales, former manager of the Walhalla Mine and an engineer of repute employed as a consultant by the Victorian Government, took samples at the Mount Hepburn Mill.

Rosales determined that the waste being discharged from the Mount Hepburn Mill showed a loss of 6 dwts. 12 grains of gold per ton of ore crushed. Fine slimes being produced from the Otis crusher, sliming being a notorious feature of these mills, assayed at 9 dwts. 18 grains gold per ton of fine slime plus 9 dwt. 18 grains of silver whilst the thick slime component assayed 6 dwts. 13 grains gold and 11 dwts. 18 grains silver per ton of thick slime.

The efficiency of gold recovery at that time may consequentially be calculated from the recovered grade of the first clean up in November, 8.9 dwts. per ton and from Rosales sampling of the waste. The efficiency is calculated at about 58%. Such an efficiency is not low for plain mercury amalgamation of an ore known to contain significant quantities of sulphides of iron and arsenic and lesser quantities of sulphides of copper, lead and zinc.

The attitude of Mr. Ball to the provision of ancilliary appliances to go with the Otis crusher is to say the least curious in one who had interests in other mills,the Rose at least having Halley percussion tables, and who must also have had a knowledge of the far more efficient gold saving appliances being used then at McCulloch & Ekberg's plant at Cassilis.

For little extra expense he could have installed a hydraulic separator, labyrinth and Frue vanners which would have collected most of the pyritic material with which a considerable amount of the gold is finely associated and at the same time made a significant impression on the slimes. His effective recovery of gold could well have been improved to 75-80%. The pyrite concentrate could even then have been readily sold to Mr. Deeble of the United Pyrites Company in Bendigo.

In addition, the tailings could have been stored for subsequent treatment by the McArthur-Forrest Cyanide process, as was then already in use in Victoria, for example at the Golden Mountain Mine at Tallangalook.

One might well say such comments are easily made with the benefit of hindsight, but Rosales said much the same at the time and in November, Austin Stanton a minority interest holder in the mine was also to suggest the possibility of adding a vanner.

Subsequently a number of assays of tailings were made by and for the company showing losses much greater than determined by Rosales. These have to be treated with caution as there is no related head grade of the ore which could have well been some of the richer grade material, for instance that taken from the Beehive.

In December the mine was honoured by a visit from J.B. Patterson, the Prime Minister of Victoria, following which what was described as a sumptuous lunch was held at Wilson's Mount Markey Hotel in Cassilis at which Mr. Ball presided.

Visits of leading political figures to the booming goldfield were then in fashion. In early February 1894, the mine was visited by the Minister for Mines, Mr. McColl in company with the local member and future Minister for Mines, Harry Foster. Mr. Ball again presided at the Mount Markey Hotel.

By February 1894, also, the Mount Hepburn's Otis Crusher had settled down to a weekly average throughput of 140 tons, which allowing for normal maintenance downturn was probably around one ton per hour of use. Yields averaged 8 dwts. of free gold per ton, a return which Mr. Ball stated was paying handsomely because of the cheap running costs and cheap mining. At this time, however, he may well have been thinking of the gold being lost in the railings as he talked of treating them by the chlorination process.

The mine was possibly being talked up a little then and was coming to the notice of Melbourne investors. By April, it was stated that 4,000 tons had been treated for an average yield of 7.5 dwts. of free gold per ton. Publicity was being given to the mine in the Melbourne newspapers and in the Australian Mining Standard.

Curiously, this publicised yield of 7.5 dwts. per ton was quite probably conservative. The mine records as provided in July 1895 by E.A. Ball to James Stirling, the then Assistant Government Geological Surveyor, show that 3,923 tons of ore from the main workings on the Mount Hepburn Lease had returned 1,592 ounces of free gold, a recovered grade of 8.12 dwts. per ton. That grade is fairly well consistent with Mr. Ball's statement of February.

What seems likely from analysis of the available figures is that by April, 1894, the then current production was returning 7.5 dwts. per ton.

MOUNT HEPBURN COMPANY N.L.

On 13th June 1894, Edward Ball had the Mount Hepburn Company N.L. registered with a nominal capital of £12,000 in 120 shares of £100 each of which £52.10.0 was then paid up. The value of the Company's leases and plant was stated to be £6,000 and Edward Abraham Ball was allocated thirty-eight of the shares credited as paid up to £52.10.0.

All the shareholders were from Melbourne and Ball with his thirty-eight, was the largest.

In July, there were twenty men working at the mine and Mr.Lewis from Glen Wills was appointed mine manager. There were stories that additional plant was to be installed.

The optimistic tone was short-lived. As with many companies sufficient attention had not been paid to forward development and exploration and as a consequence production of ore had dwindled and most probably ceased altogether in or soon after July. The mill was certainly closed down for most if not all of the latter half of the year. By December, Mr. Lewis had resigned and the mine was under the management of Edward Ball Junior.

In the period from incorporation in June to the end of November, gold sold had a value of only £225.14.6., costs of mining etc. had been £1,102.9.7., and new plant expenditure amounted to only £55.1.4. Another £6 per share, a total of £720, had been subscribed but evenso cash at the bank was only about £171. It is fairly clear that Edward Ball Senior had, apart from shares, received most of the cash proceeds raised at incorporation.

Notwithstanding any problems as to slimes, the Otis crusher's capacity and apparently also its relatively low running costs must have impressed others, for in November 1894, tenders were called for the erection of an Otis crusher at the Homeward Bound and Maude gold mines at Glen Wills.

1895 was to be a year of ups and downs for the Mount Hepburn. Initially under Ball Junior's management working ten men on the reef, developments looked promising but, at mid-year the mill was again idle for want of both ore and additional equipment.

In July 1895, James Stirling visited the mine and had access to a number of company records, as made available by E.A. Ball Senior. These records importantly indicate that:

- From twenty-one assays by A. Allan of insitu stone from the line of lode including the Beehive, the average head grade was anticipated to be 16.5 dwts. per ton. The assays ranged from 8 grains to 2 ounces 9 dwts. 3 grains per ton.

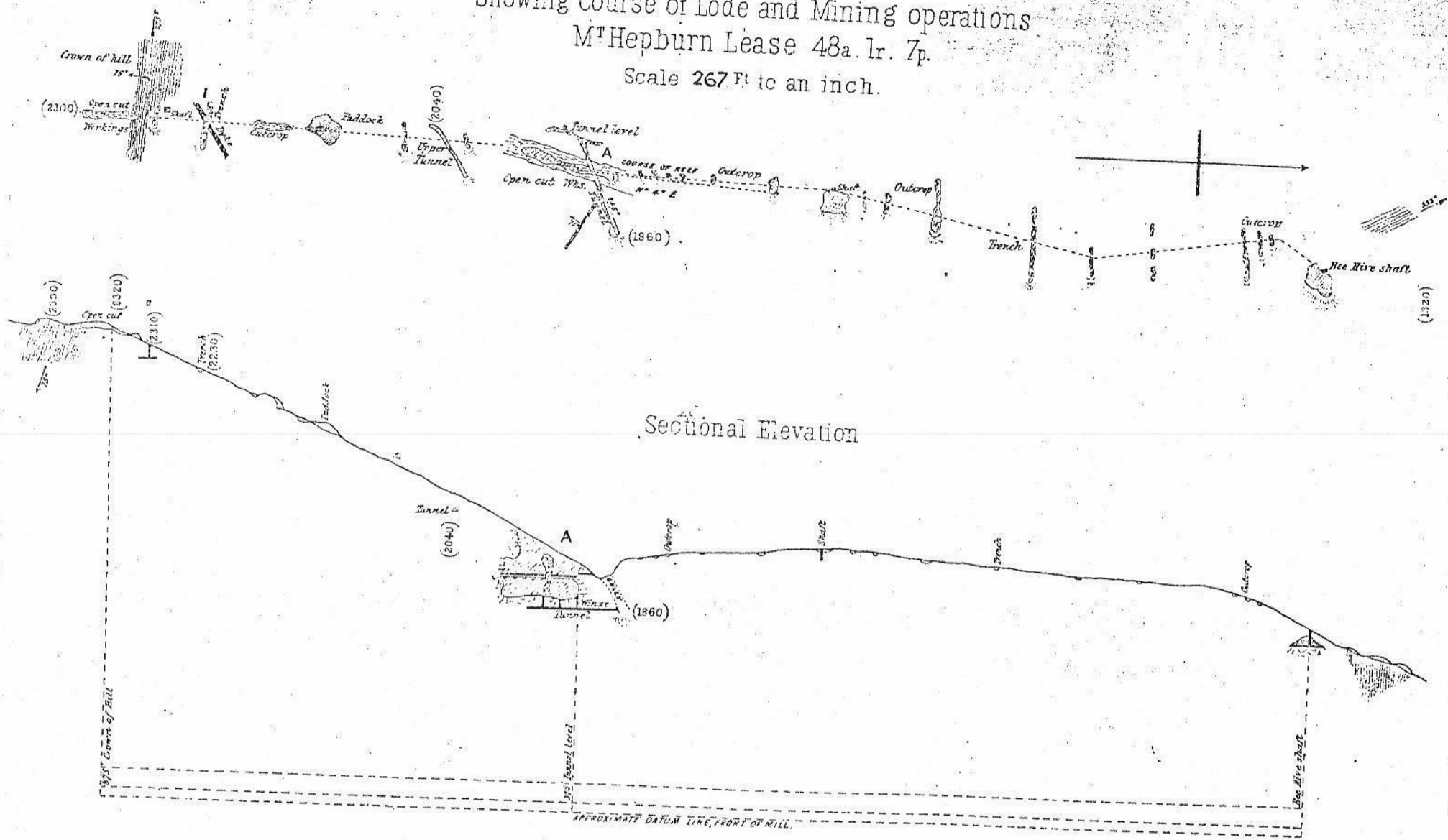
- Offers had been received to purchase blanketings for £6.3.8. per ton. Selected assays of the blanketings returned 3 ounces 10 dwts. and 4 ounces per ton.

- Assays of samples of specimen quartz ranged as high as 8 ounces 15 dwts. per ton.

- Most probably the only ore crushed in the year July 1894 to June 1895, was 249 tons from the Beehive which returned 261.5 ounces of free gold, a recovered grade of 1 ounce 1 dwt per ton, and,

- Assays taken of material recovered from boring into the foot-wall of the existing northern stope returned values averaging 5 dwts. per ton over a four foot depth.

PLAN Mt HEPBURN Co's MINE.
Showing Course of Lode and Mining operations
Mt Hepburn Lease 48a. 1r. 7p.
Scale 267 Ft to an inch.



Sectional Elevation

PLAN OF MOUNT HEPBURN WORKINGS BY JAMES STIRLING 1895

Perhaps even more importantly, Stirling made a number of observations as to the character and likely extent of the lode, significantly that,

- From observations made by him at several places along the line of lode, the quartz lode was not continuous but would in all probability be found to consist of a number of separate lenticular shaped swellings or blows,

- The lode formation was likely to continue in depth for many thousands of feet, probably 5,000 feet (and in effect, this depth might provide large reserves) and,

- The pitch of the lodes had yet to be determined.

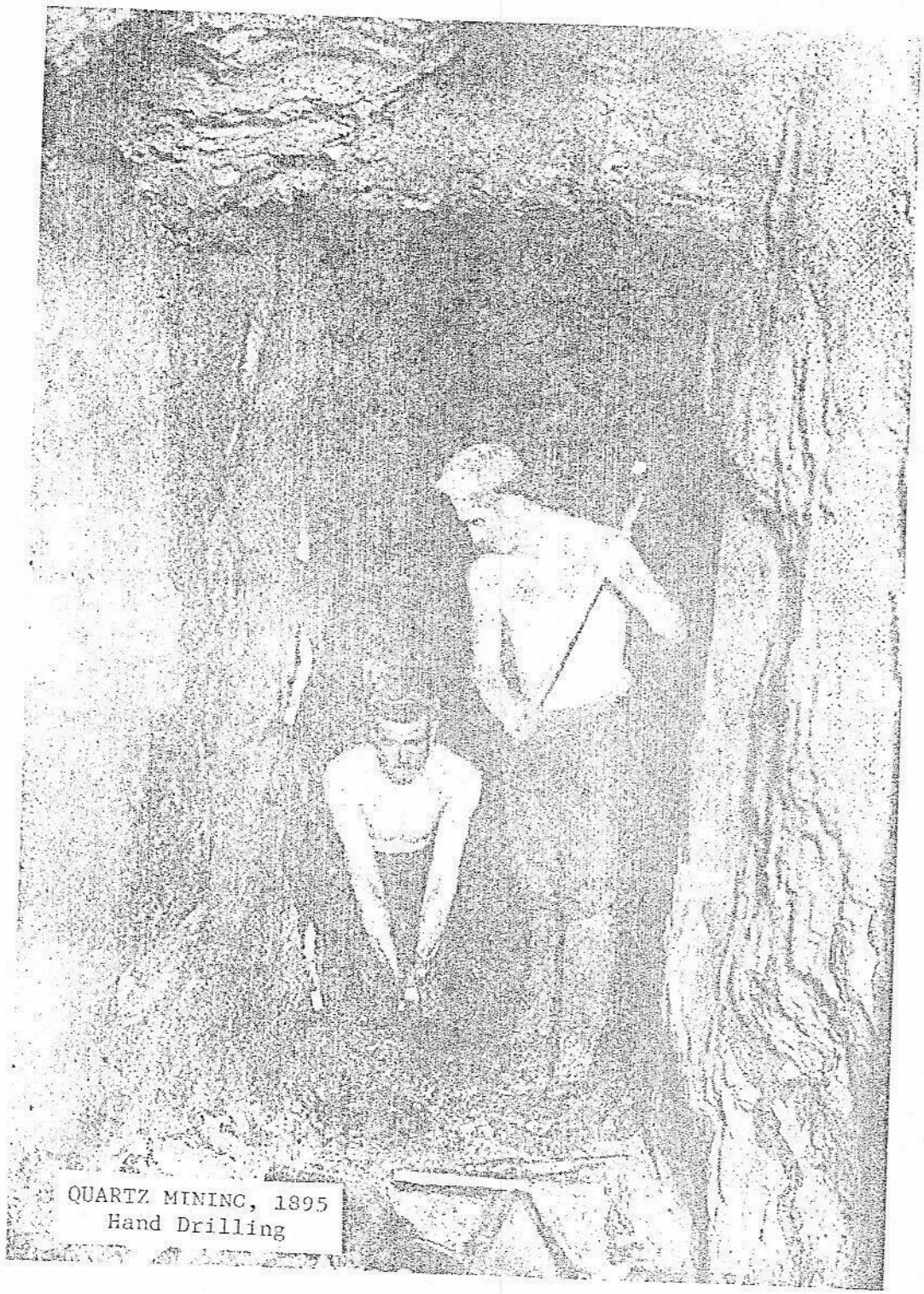
Stirling's report upon his visit was not published until 1899 but no doubt his conclusions and observations were available to Mr. Ball and others shortly after his visit.

In December of 1895, Reginald Murray, the popular and respected Government Geologist visited the mine. He commented that it was perhaps the most remarkable mine in the Cassilis field, being an immense formation proved for more than a half-mile and (cautiously), "as much as" 50 feet thick, all auriferous.

He noted also that it was claimed that 6,000 tons of ore had been treated for an average return of 7 dwts. per ton with an equal or even greater amount being lost. He was somewhat scathing of the lack of ancilliary gold saving and concentrating plant. He suggested that the prospect could be suitable for a large capital enterprise.

Murray's note as to production indicates two matters of interest. First, that only about 2,000 tons of ore had been treated in a little over eighteen months or so since April 1894, (since at that time 3,923 tons had in all probability been treated for an average return of 8.12 dwts.per ton). Secondly, that the grade had dropped significantly in that last eighteen months or so. If we deduct the 249 tons of ore treated from the Beehive for a return of 261.5 ounces, then around 1,800 tons of ordinary run of mine ore had been treated for a return of only 2.7 dwts. per ton.

This last, the drop in grade, would indicate that little development had been carried on or, if it had, it had not been successful, and in any event most probably that the company had chosen to continue mining out to the extremities of the big blow. It will be remembered that the first recorded large crushings returned 16.4 dwts. per ton, then 9 dwts., then 8.9 dwts. from the first Otis crusher clean-up, then down to an average of 8.12 dwts. for all ore to April 1894, and to the average of 7.5 dwts for current production at April 1894. This is a pattern that could well be consistent with mining only a big blow of the nature found at the Mount Hepburn.



QUARTZ MINING, 1895
Hand Drilling

As noted by Stirling, drilling into the extremities of the main northern stope had returned head values, averaging 5 dwts per ton which from what we know of the losses, is fairly well consistent with the deduced recovered grade of 2.7 dwts. per ton.

It is concluded therefore that production in the latter half of 1895 was from the main open stope and amounted to perhaps 1828 tons for a return of 246.5 ounces of free gold.

Conflicting with Murray's note as to production were statements made later, in 1896, to the effect that 8,000 tons had been treated for an average return of 8 dwts per ton. This must be disregarded since it is inconsistent with known events and figures quoted earlier and Murray had a reputation for reasonable accuracy. Further, the statement was made at a time when new English owners had taken over and everyone was talking big.

TEMPORARY CLOSURE AND TRIBUTING

By the close of 1895, operations of the Company had been halted and the Company had successfully applied for a suspension of the labour covenants for its two leases, then Nos. 1685 and 1859

Lease No. 1685 was a consolidation of the former Smart Boys/Mount Hepburn Lease No. 1037 and the Beehive Lease No. 1525, having in total an area of 48 acres 1 rood 7 perches, and known as the Mount Hepburn Lease. Lease No. 1859 was of 22 acres 3 roods 16 perches and is taken to be that known as The Mount Hepburn South.

The Beehive end of the Mount Hepburn lease and later the whole lease, were let on tribute to Giles & Party. In May 1896, they cleaned up 45 ounces from 33 tons from the Beehive and from an 18 ton parcel of Mount Hepburn ore obtained about two ounces per ton, both at Ryan's Battery.

Suspensions continued to be renewed for Leases 1685 and 1859 and in early July 1896 came Edward Ball's master-stroke.

Notice was given of a meeting of the shareholders of the Mount Hepburn Company N.L., to be held on 20th July to voluntarily wind up the Company. The real news as publicised was that the Company's property was to be sold to a newly formed English Company.

MOUNT HEPBURN COMPANY LIMITED

The failure of many companies floated to work properties in the Mount Wills - Omeo - Cassilis region had given Cassilis a bad name for investment throughout Victoria. However, and even though the English investor had also suffered losses in these fairly recent failures, the representatives of the same and other English investors had continued to look the ground over.

QUARTZ MINING, 1895
Firing a Shot

QUARTZ MINING, 1895
A Group in the Stopes

In early 1896, the first of a new wave of investment in the Cassilis area came from English investment, Omeo Gold Mines of Victoria Limited floated in London for the purpose of working the Anglo mine at the foot of the Markey Spur.

The news of an intention to form the Omeo Company in London and subsequently the news of its successful flotation could well have been the trigger that caused Ball to turn to London.

Mr. Ball and the other Directors of his company appointed Mr. Thureau, the former Government Geologist of Tasmania and Mr. Houghe, a former manager of Block 14 at Broken Hill, to report upon the Mount Hepburn property. They did this, Thureau being reported as having stated that the reef had an average width of 35 feet, altogether containing considerably over 5 million tons of ore apparently accessible by adit.

These reports were sent to London where a syndicate formed by A.J.Miller, undertook to purchase the property, subject only to verification of the reports by other experts and the testing of a sample parcel.

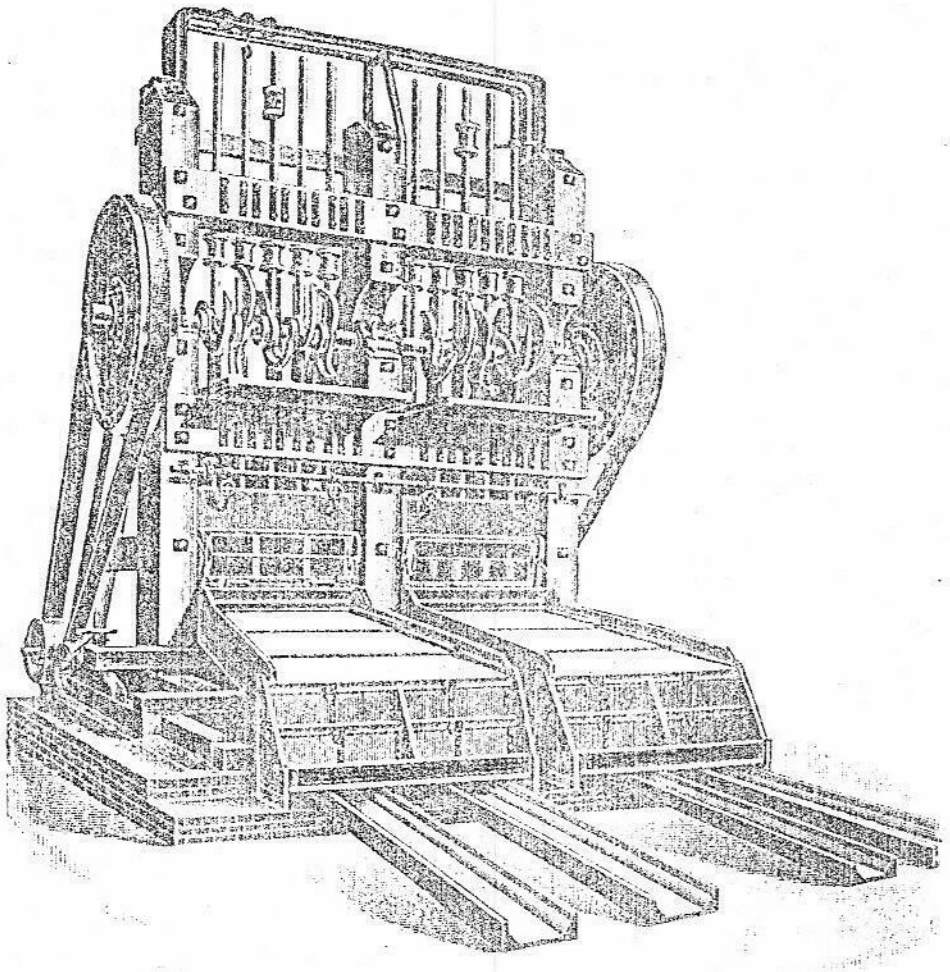
What had apparently not been told to the English investors was that James Stirling, as we know, had carefully inspected the prospect and noted or inferred amongst other things that, the lode was not continuous and consisted of more or less separate lenticular "blows", the average head grade had been determined as around 16.5 dwts. per ton and that the key to major reserves was the probable depth up to 5,000 feet but as yet the pitch of the structure had not yet been determined.

Mr. Crawford, a mining engineer with experience in South Africa and Reginald Murray, who had recently inspected the mine, confirmed Thureau's statement. Murray's reputation was so high that in England it was said later in 1896, that a good report by him "will float anything in London in two hours".

A parcel of two tons of ore was sent to England, was inspected and reported upon favourably by J.J. Hamilton,a mining engineer with considerable experience on the Rand,and was tested by the Gold Ore Treatment Company and found amenable to cyanidation. Both the Gold Ore Treatment Company and Johnson & Matthey, assayers to the Bank of England, agreed that the ore contained about two ounces of gold per ton.

To round everything off, Mr. T. Hall a prominent shareholder in the famous Mount Morgan Mine stated that he was greatly impressed with the sample parcel and considered it to be not unlike Mount Morgan ore.

As a consequence the Mount Hepburn property was purchased and the Mount Hepburn Company Limited was formed and floated in London about July or August 1896, with 200,000 shares of £1 and an initial working capital of £50,000.



TYPICAL HEAVY DUTY STAMP BATTERY

1896

Just what the old Company was paid for its property is not at present known, but it was no doubt considerable as Edward Ball was in the position in September to purchase Peter Forsyth's Lady McGregor Battery, which he promptly renamed the Gum Forest Battery.

In August, Mr. A.J. Miller arrived in Victoria to temporarily look after the interests of the new company. He talked of erecting a 60 head heavy duty stamp battery and the possibility if all went well of extending this to 120 heads.

He was anticipating that the tailings would be treated by the new Sulliman & Thead bromo-cyanide process which was he said, much faster than the McArthur-Forrest process (which was then in fairly wide use in Victoria and Australia). He saw no problem with the pyrites which he understood were present in the Mount Hepburn lode though he did say that elsewhere in Victoria where copper may be present, the process would be ineffective and chlorination might then be the answer!

Mr. Miller had every right to be particularly concerned with the treatment of the tailings. As we have seen, the previous losses had been high, according to Rosales investigation the losses were around 6.5 dwts. per ton of ore treated. However, at the time of Mr. Miller's arrival the losses were being quoted as fully 17 dwts. per ton, a significantly different picture and certainly completely incorrect.

Exaggerated claims were made and publicised as to the potential value of the mine. From the report by Mr. Miller that the sample parcel sent to England had assayed at 2 ounces more or less per ton, it was but a short step for the newspapers to indicate that this might well be an average grade; a grade that bore no resemblance to the 16.5 dwts. determined by A.Allan and noted by Stirling.

THE NEW COMPANY STARTS ON SITE

September 1896 was a busy month. Twenty men were working at the mine; Mr. W.H.Hobby was appointed mine manager and W.G.Ball appointed underground manager. Tenders were called for a sixty head stamp battery and it was announced that pending its delivery and erection the Company would continue to crush with the Otis Crusher and treat the railings in a small cyanide plant. A contract was let to Pring of Ballarat for the supply of two twenty-ton capacity vats for that cyanide plant.

Not all was straight forward going however. There was an attempt by the Company and Mr. Lowe who had the contract to run a Company Store to remove a miner, Robert William Stanley, from his residence area adjacent to the track into the Mount Hepburn and near to the mill site.

MOUNT HEPBURN WATER RACE, 1978

The matter was heard before Mr. Warden Holmes at the Omeo Warden's Court on 25th September and the Warden found for Mr. Stanley who retained possession of the ground that he had occupied for three years since 1893.

In October a contract was let to Thompson & Co., of Castlemaine for the sixty head battery, the vats were delivered to site and it was reported that the average grade of ore encountered driving north underground was 3 ounces 19 dwts per ton!

Late in 1896 Mr. Robert Hutchinson ("Bulawayo") Hamilton, so nicknamed because of his considerable mining experience in Africa, had arrived at Tongio West and taken up his position as General Manager. It seems probably that he was related to the J.J. Hamilton who had earlier reported upon the two ton sample parcel of ore sent to London.

The suspension of the labour covenants on Leases 1685 and 1859 continued to be extended but in fact there was no risk of forfeiture since work on site continued at a feverish pace. By the close of 1896, the battery site for sixty heads was cleared and foundation construction had commenced. Preparatory works for the erection of the engine, boiler, water storage and new tramway from the Beehive level were underway. A start had been made on the water race from Upper Swifts Creek as suggested by Murray in 1895.

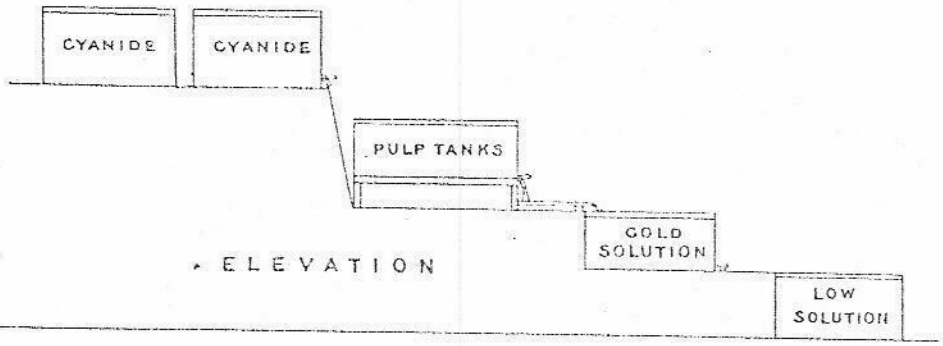
Underground the south drive had been extended 180 feet to 310 feet, the north drive about 90 feet to 330 feet and a contract to cut a new adit on the Beehive had advanced to 148 feet. A northern level cross-cut was in 18 feet.

The underground development had not confirmed the likely extent of ore reserves previously anticipated by the new Company. As a consequence, Hamilton had quickly assessed that sixty heads of stamps were not warranted and that twenty heads were adequate for the foreseeable future.

Delivery of the twenty head stamp battery was made in March 1897, the other forty heads remaining at Castlemaine pending ultimate sale to other parties.

To expedite the development, if possible, of additional ore reserves a contract was let in February 1897 for driving an intermediate level (interum) adit. By mid-year this had been driven 480 feet, the Beehive adit 423 feet and in all, development advances on these, the north and south drives, exploratory cross-cuts, rises and winzes totalled in excess of 2,000 feet by then. In order to provide greater scope for the discovery of the required additional ore reserves a further lease of about 60 acres had been applied for in February, to the west of Lease 1685.

PAUL'S CYANIDE PLANT



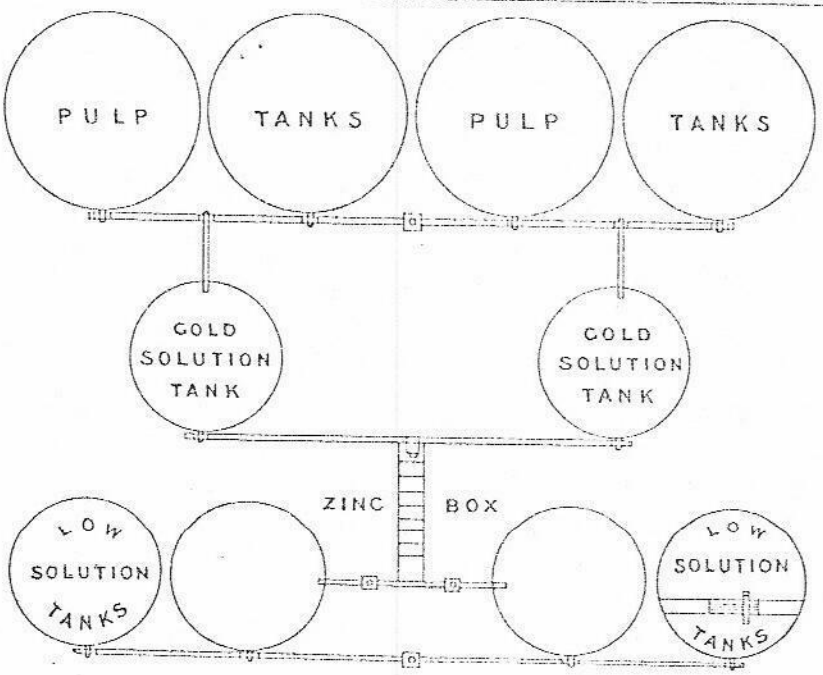
ELEVATION

CRUSHING FLOOR

FOR ANY DESIRED MACHINERY

WET OR DRY

GROUND PLAN



This development work unfortunately continued to be disappointing. In fact the work proved that the ore-body was not continuous but that it was made up of separate blows separated by blank ground, as had been stated by Stirling two years earlier.

Work upon the plant continued apace.

In February 1897, because of the poor state of the bridges along the Tambo Valley Road it was agreed with Mr. Thornburn, the cartage contractor, that the eleven ton, 25 foot long by 6 foot diameter 90 horsepower boiler could be cut into sections for delivery. By March, it had been delivered in its sections without difficulty and boiler-makers were on site re-rivetting it back into one, and by April it had been fired and tested. Contracts for the supply of firewood had been let.

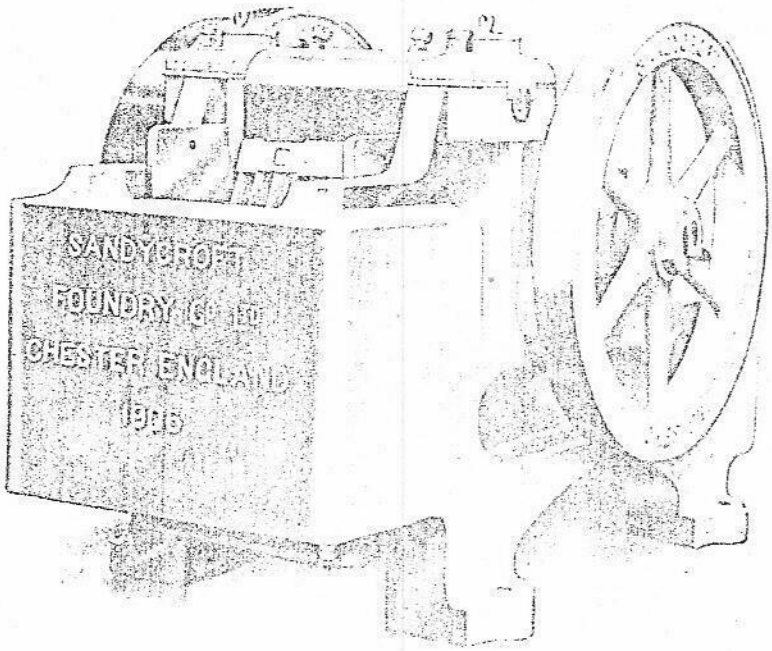
TRIAL CYANIDATION

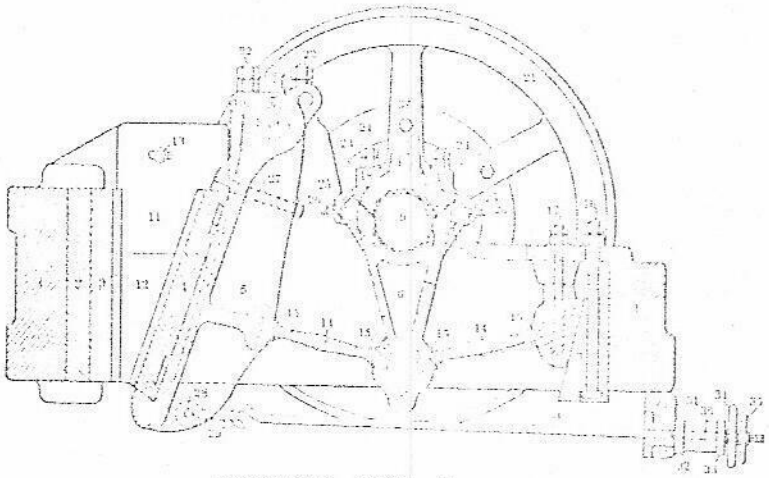
In March 1897, Mr. Forbes had arrived on site and taken charge of the trial size cyanide plant and by the end of that month the first batch of tailings from earlier crushing by Ball were in solution. These tailings were recovered from the Creek. By mid-year 351 tons had been treated for the most satisfactory and exceptional return of 205 ounces 3 dwt of gold, a recovered grade from the tailings of 11.75 dwts per ton. Presumably these were substantially the high grade tailings from Ball's test of the Beehive ore.

Irrespective of the rather fine return from this first trial of the cyanide process, not everyone was convinced of its long term success on Cassilis ores. A mining reporter, who might well have been Donald Clark the widely respected Director of the Bairnsdale School of Mines, expressed his view that success was unlikely without additional forms of prior reduction, as the straight cyanide process was not appropriate for tailings or ores containing much more than 5% of sulphides. He noted that once into the sulphide zone in the Cassilis area the ore could contain 50% of sulphide minerals.

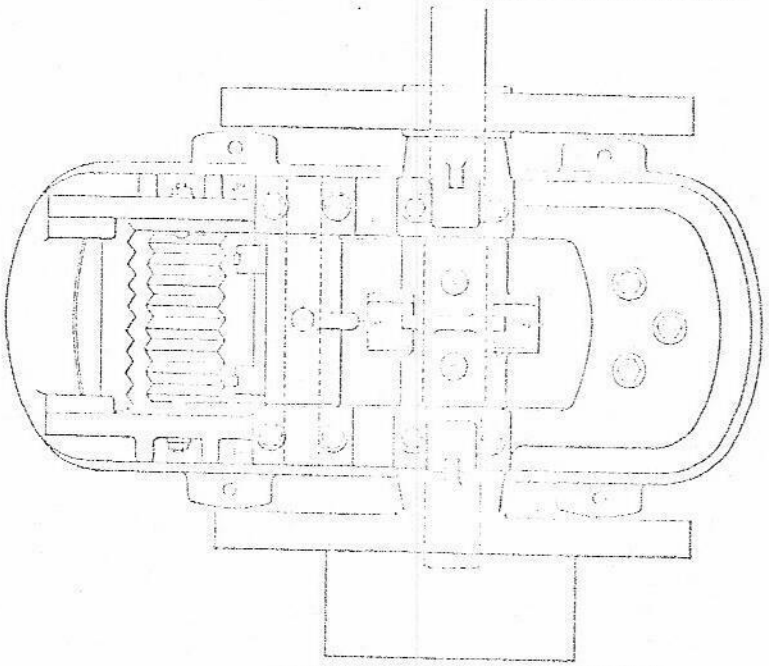
STAMP BATTERY COMMENCES CRUSHING

On 18th August, 1897, the twenty-head battery commenced crushings. The battery had 900 pound weight stamps and used 250 mesh woven wire screens. Ore for the battery was delivered from the mine by a three rail balanced tramway 800 feet in length, discharged through the top level of the battery house for primary crushing of oversize material by a Blake & Marsden Ore Breaker, discharging with the under-sized by-passed material into an 80 ton capacity hopper. The battery was designed to handle 60 tons per day.





SECTIONAL VIEW OF BLAKE TYPE BREAKER.



PLAN OF BLAKE TYPE BREAKER.

BLAKE-TYPE OREBREAKER

Although as noted earlier, the 90 horsepower boiler had been installed and tested it was not then to be used. It had been designed to drive the proposed 60 head battery but as only 20 heads were installed, the already existing 16 horsepower portable steam engine was adequate to the task and more economical. To service the larger but unused boiler, a brick smokestack about 60 feet high had been built near the battery on the hillside.

On 4th Septemner, the product of crushing the first 200 tons of ore was cleaned up but the result was not made public. All that was said was that the result was not considered satisfactory, the gold was fine and difficult to amalgamate and that the tailings assayed at 14 dwts. per ton.

The official returns by the Company to the Department of Mines, however, do record the poor returns obtained by the battery. In 1897, the battery treated 1083 tons for a return of 309 ounces, a recovery grade of 5.7 dwts. per ton.

If the quoted 14 dwts. in the tailings was representative of the ore for 1897, then the Company were treating selected high grade ore of about one ounce per ton head grade and the efficiency of the battery amalgamation was approximately 29% or roughly half the efficiency obtained by Mr. Ball and the earlier Company using the Otis Crusher.

Under an arrangement then recently made between the Mount Hepburn Company and the General Exploration Company, a German-based group, the General Exploration Company had the right to treat the tailings from the amalgamation plates, the Mount Hepburn Company not being allowed to use any other gold saving devices. In return for the arrangement, the General Exploration Company were to build a cyanide treatment plant and pay a percentage royalty on gold sales to the Mount Hepburn Company.

The Otis Crusher incidentally was sold to the Warden Company's Chlorination Works at Cassilis, where the manager, Mr. Hazelton found use for it in dry crushing their material.

END OF AN ERA - DEATH OF MR. BALL

In September 1897, the colourful Edward Abraham Ball, Senior, died. There is no question that he, together with George Smart earlier, had been driving forces in the emergence of the Cassilis - Tongio West area as a goldfield area attractive to Melbourne investors.

Always a man of considerable drive and looking to the novel solution to problems, Ball must have derived a wry satisfaction in his last months in observing that his Otis Crusher arrangement had been more efficient than the new Company's expensive plant.

MINING AND CRUSHING SUSPENDED

Because of its poor returns from crushing and straight amalgamation the Mount Hepburn Company temporarily ceased mining and treatment operations in October 1897. In November they were granted a suspension of the labour covenants for three months on Leases Nos. 1685, 1859, and 2798 pending completion of the cyanide plants. Lease 2798 had been recently granted for that area applied for in February, immediately to the west of Lease 1685.

Extensions of the lease suspensions continued to be granted through to June 1898, when the cyanide plant was completed and mining recommenced followed shortly by recommencement of crushing.

THE CYANIDE PLANT CONSTRUCTION AND THE GENERAL EXPLORATION COMPANY

As we have noted, the General Exploration Company had entered into an agreement with the Mount Hepburn Company to treat that Company's tailings.

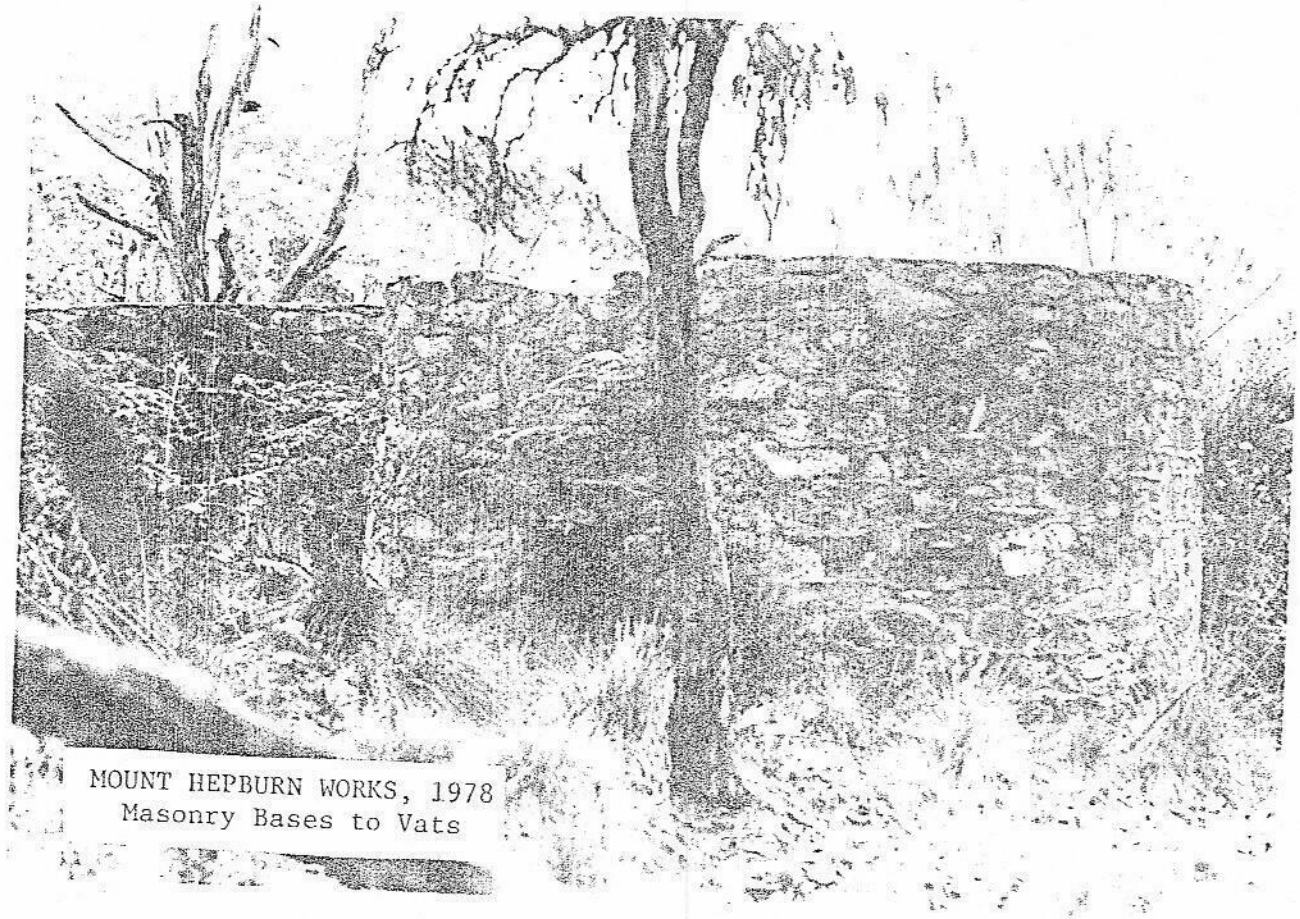
The General Exploration Company were the holders of the patent rights in Australia of the German Siemans-Halske cyanidation process, which on a world wide basis was probably the principal opposition system to the British MacArthur-Forrest process. They undertook to erect and run at their own cost a suitable cyanide plant with a capacity to treat up to 3,000 tons of tailings per month. In return they received a percentage of the gross sale value of the gold obtained from the tailings, the Mount Hepburn Company receiving the balance.

In July 1897, presumably as a consequence of the successful trial cyanidation, Mr. George Kermode was on site planning and setting out for the 3,000 ton per month using the Siemens-Halske electrolytic precipitation cyanide process. Kermode is believed to have formally been an employee of the Australian Gold Recovery Company, the holders in Australia of the patent rights to the MacArthur-Forrest process.

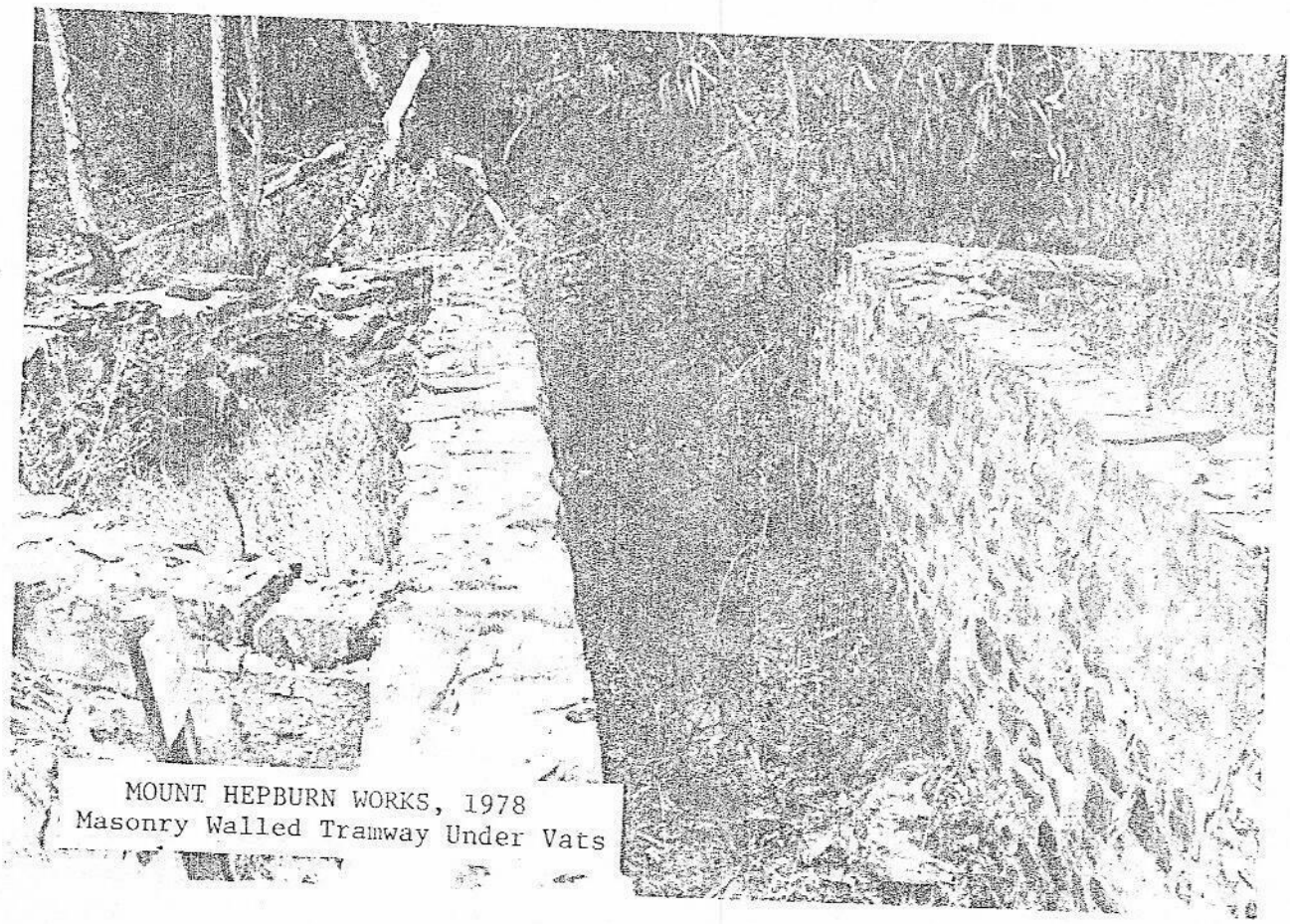
Kermode called tenders in late July for 2,000 cubic yards of site excavation and in September called tenders for the provision of materials and the construction of approximately 700 cubic yards of masonry walls and piers for the plant situated about 150 yards downhill from the battery.

Very largely it is these walls and piers that we now see remaining on the Mount Hepburn - King Cassilis lease area.

The vats were made by Messrs. Bowman and Bow, Coopers of Maldon whilst the contractors for the masonry walls of local schist were Messrs. T. Haughton and McKenna.Skilled masons were brought from Melbourne by the masonry contractors.



MOUNT HEPBURN WORKS, 1978
Masonry Bases to Vats



MOUNT HEPBURN WORKS, 1978
Masonry Walled Tramway Under Vats

The cyanide plant cost the General Exploration Company £7,000 and under the general direction of George Kermode and the site supervision of Mr. Smart the plant was considered to be if not the best, at least one of the best, in Australia.

Tailings were taken by tramway from their discharge at the battery plates to six collecting vats each of 60 ton capacity. Each collecting vat was built over a tramway and was fitted with an automatic distributor and discharging ring and Butters bottom discharge doors.

After draining in the collecting vats the sands were discharged into trucks underneath which were hauled up an inclined tramway by means of a steam winch, to the top level of the six treatment vats each of which was 23 foot diameter, 8 foot high and had a capacity of 90 tons. These also had a tramway underneath and after discharge of the sand again by bottom discharge doors, it was transferred by truck to the sand dump and dam.

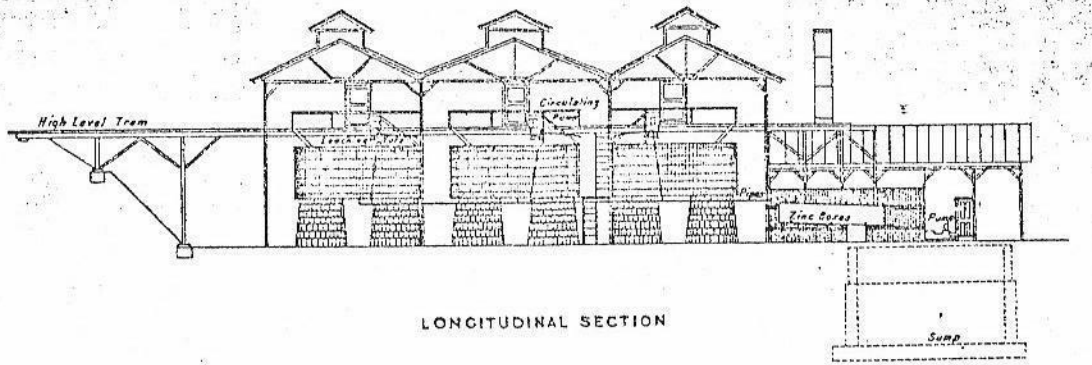
Prior to discharge of the treated sand, the solution was run to four storage vats each 13 foot diameter, and thence through intermediate vats prior to its discharge into the electrolytic precipitation boxes which were 40 feet long and 6 feet 4 inches wide.

In all there were 26 vats, the elevated vats being supported on circular walls or on semi-circular walls and the walls either side of the central discharge tramway.

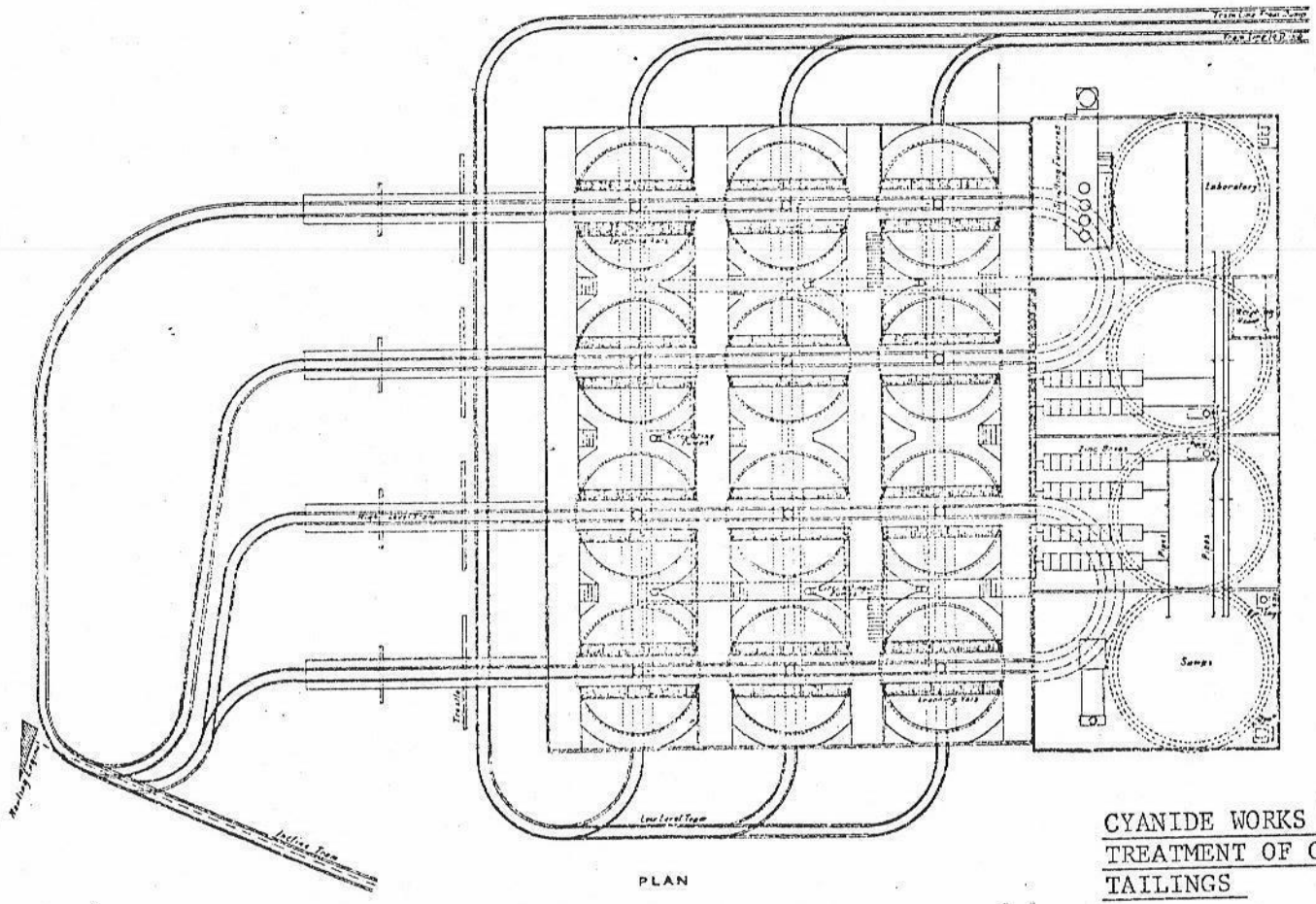
The whole plant was carefully designed and elevated to ensure a minimum labour requirement and minimum manual effort.

The positions of the elevated vats and the under-vat tramways can be readily seen by inspection of the masonry work now remaining at the site and which are illustrated in the photographs hereto.

A typical efficient cyanide plant of the area with high and low level tramways, with elevated vats supported on masonry piers and with low level vats (sumps in the case illustrated), is shown on the drawing also included herewith. The illustrated plant, however, used zinc shaving precipitation and not electrolytic as in the Mount Hepburn plant.



LONGITUDINAL SECTION



PLAN

CYANIDE WORKS FOR TREATMENT OF GOLD ORE TAILINGS

In May 1898, a little prior to completion of the plant, two young brothers F.W. and J.L. Allsop arrived on site to take charge of the operation for the General Exploration Company. They had obtained their early training at the Ballarat School of Mines and early experience in the Central Victorial Goldfields, following this up with a period around Johannesburg, where they became knowledgeable in cyanidation. Like Mr. Kermode earlier, they had been employees of the Australian Gold Recovery Company.

F.W. Allsop was manager of the works and J.L. Allsop was electrical engineer.

To ensure reasonable reserves of tailings for treatment, since the Mount Hepburn Company had crushed so little, the General Exploration Company had purchased about 3,000 tons of tailings from the Ryan Brothers at their Brave George battery across the creek and attempted to purchase another 2,000 tons from the Warden Company's Chlorination Works, formerly McCulloch and Ekberg's.

In that last they were probably unsuccessful as by August 1898, the Cassilis Tailings Syndicate were commencing upon construction of a small cyanide plant to treat the tailings at the Warden's Works.

Commentators at the time were still forecasting failure of the General Exploration Company's operation unless they added a furnace to treat the heavy sulphide content of the tailings. The Company responded to these gloomy forecasts with the contention that much of the reserve was from the oxidised levels.

By early June, all vats were full and tailings treatment commenced.

MINING AND CRUSHING RECOMMENDED....

At the end of May 1898, the Mount Hepburn Company recommenced mining and there was considerable optimism expressed as to the quantity of ore available. There were even rumours of additional battery capacity being planned.

By mid-June the battery was operating again, on a full-time basis.

....BUT QUICKLY STOPPED

For good reason the Mount Hepburn Company kept their battery returns to themselves for some months.

However, on 20th September 1898, Robert Hamilton released the latest returns, 370 tons crushed for 35 ounces 8 dwts., an average return of 1.92 dwts. per ton.

At the end of September, all mining and crushing by Mount Hepburn Company Limited ceased and brought to an end their shortlived career at Tongio West.

In the period between May and September they had crushed 2,893 tons for a return of 207 ounces of gold, a recovered grade from the battery only of 1.43 dwts. per ton.

The total production of the battery during their short career had been 3,976 tons for 516 ounces, an average return of 2.60 dwts. per ton.

It is difficult to sympathise with a company who exhibited such a naive and technically and strategically incompetent initial approach to the development of the property. They had available to them if they had cared to initially consider it, the experience of Ball's earlier operation with fine grinding and the records of, and reports upon it.

Apart from that and the problem of the nature of the lodes and the difficulties of exploring for them, the Company compounded their problem by unnecessarily allowing another group, the General Exploration Company to work the tailings which obviously contained the vast bulk of the gold.

Hamilton himself made the final decision to close the Company's operations. On-site production was generating insufficient income and remittances from head office had ceased. Neither he nor the mine staff were able then to be paid.

In the latter half of November, however, sufficient money was received from London to pay all outstanding wages and accounts.

ADIEU TO MOUNT HEPBURN COMPANY LIMITED

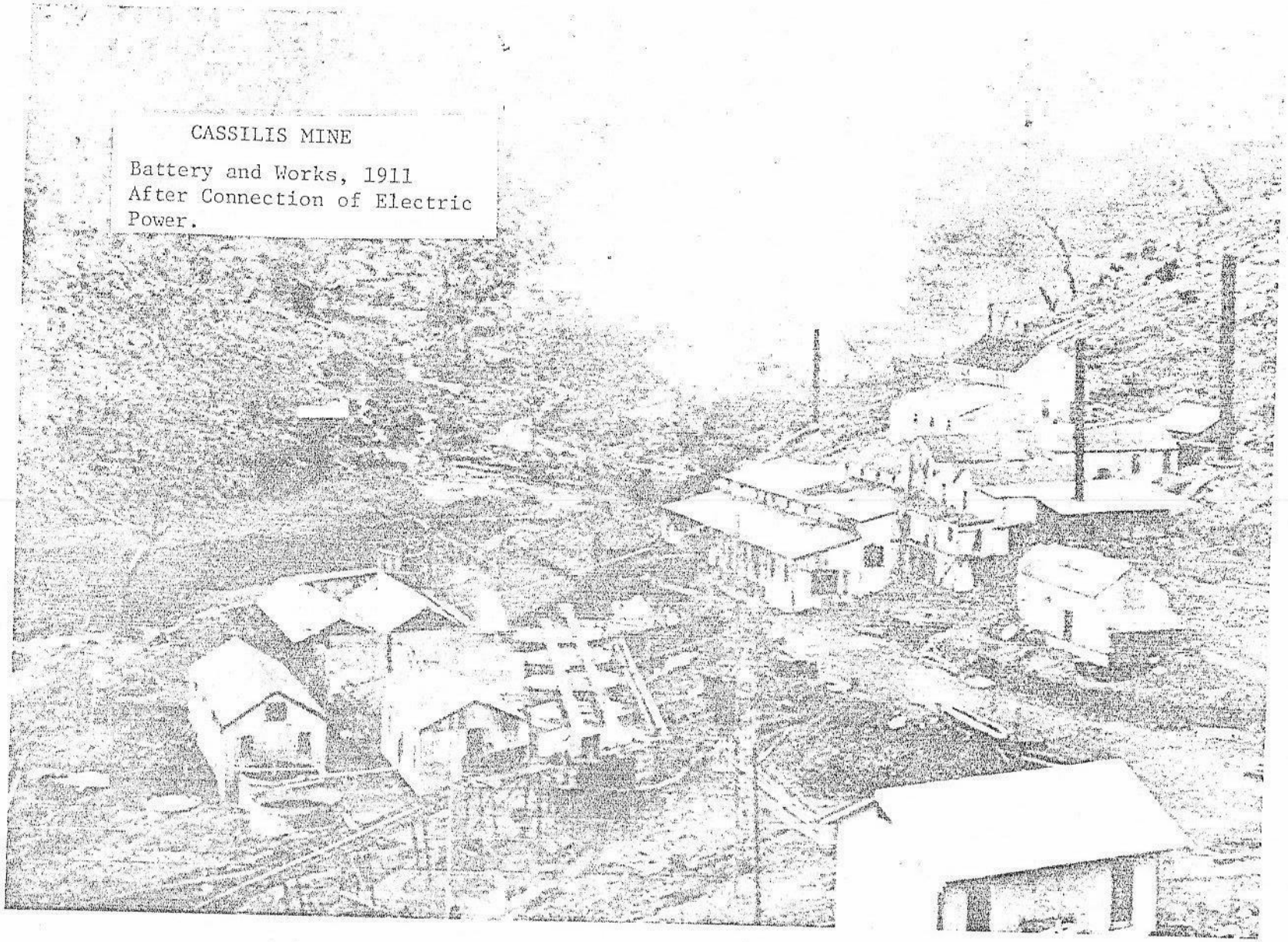
Hamilton stayed on as Manager and through 1899 the leases were subject to suspension whilst the directors of the Company decided what was to be done. Hamilton again had to make the move, this time to issue a writ against the Company, for arrears of salary which he finally received.

In late-1899 the Company decided to sell its plant and this was auctioned in Melbourne on 22nd January 1900.

The Cassilis Gold Mining Company were the successful bidders at the auction, purchasing the whole of the Company's plant for the trifling sum of £850. The twenty-head battery, engine and boiler were installed at the Cassilis mine where they serviced the Cassilis Company until cessation of production in 1916.

CASSILIS MINE

Battery and Works, 1911
After Connection of Electric
Power.



The Cassilis Company in turn sold the Mount Hepburn outbuildings, chimney stack, engine bases, plant bases, etc., to F.W. Allsop who by that time was preparing to build a metallurgical works of his own on the site.

The trifling proceeds of the sale provided nothing for the shareholders of the Mount Hepburn Company Limited who by the end of 1899 are said to have invested £180,000 in the Tongio West property.

Robert Hamilton remained in the district, taking up a reef prospect on Rileys Creek for which he had made application in February 1899.

THE CYANIDE PLANT IN OPERATION

As we have seen earlier, the cyanide plant of the General Exploration Company was in operation by June 1898, having cost them £7,000 to construct.

Throughput capacity of the plant in practice was about 180 tons per week and certainly nowhere near the 2,500 - 3,000 tons per month originally intended.

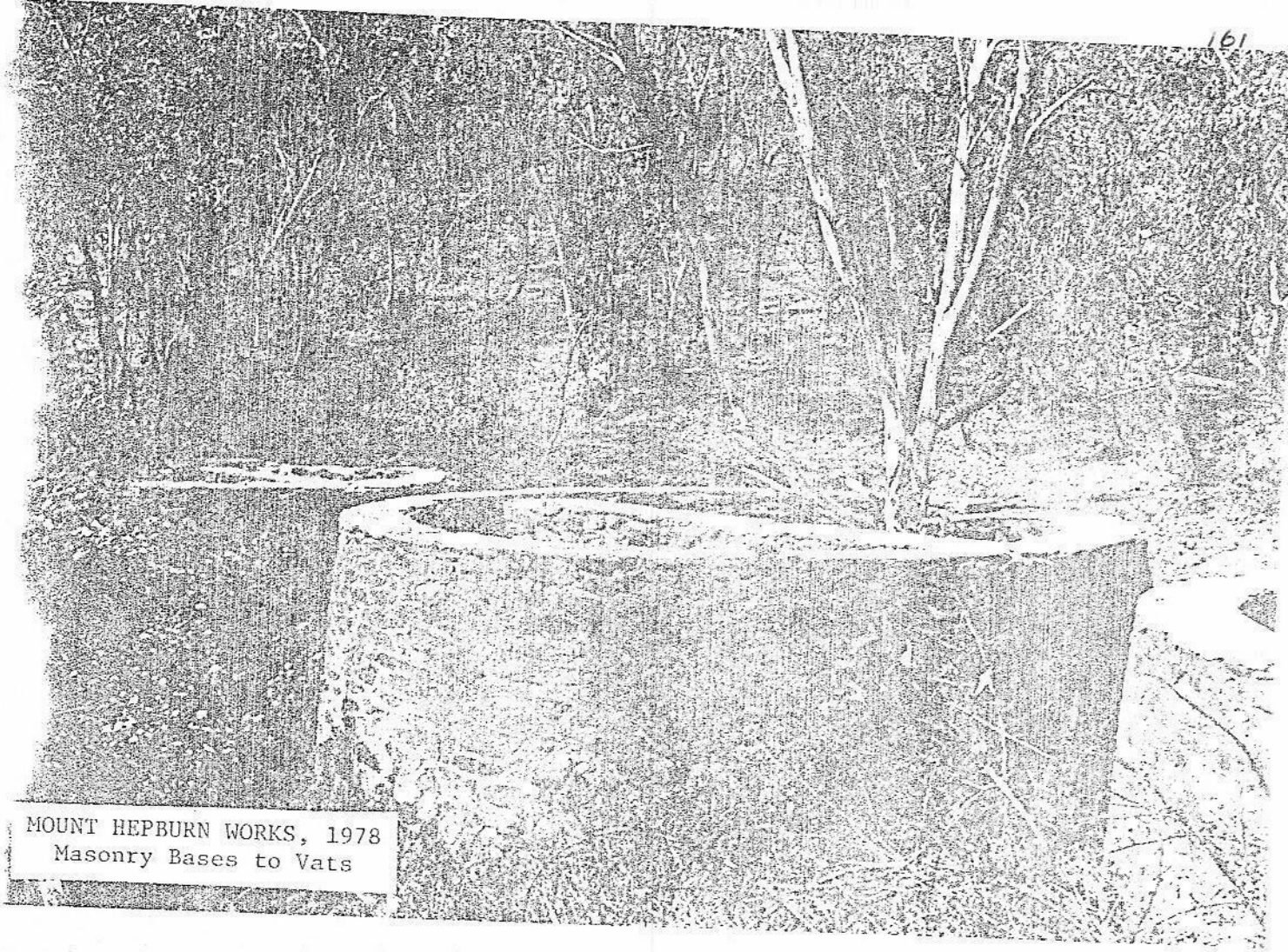
As had been anticipated by others, the composition of the ore resulted in both a lesser recovery of gold than the company had expected, a greater consumption of lime for neutralisation than had been hoped for and the need to retain the tailings in solution for two weeks. Lime from Bindi was expensive, costing the Company £3.10.0. per ton.

Many batches of tailings had head grades between 11 and 14 dwts per ton and most from Ryans Battery were substantially higher. Others were substantially lower, possibly of the order of 6 dwts. per ton or less. The average head grade is estimated to have been 12 dwts. per ton, and recovery about 70% or, say 8 dwts. per ton, the same recovery incidentally as was obtained by the Cassilis Tailings Syndicate at the Warden battery.

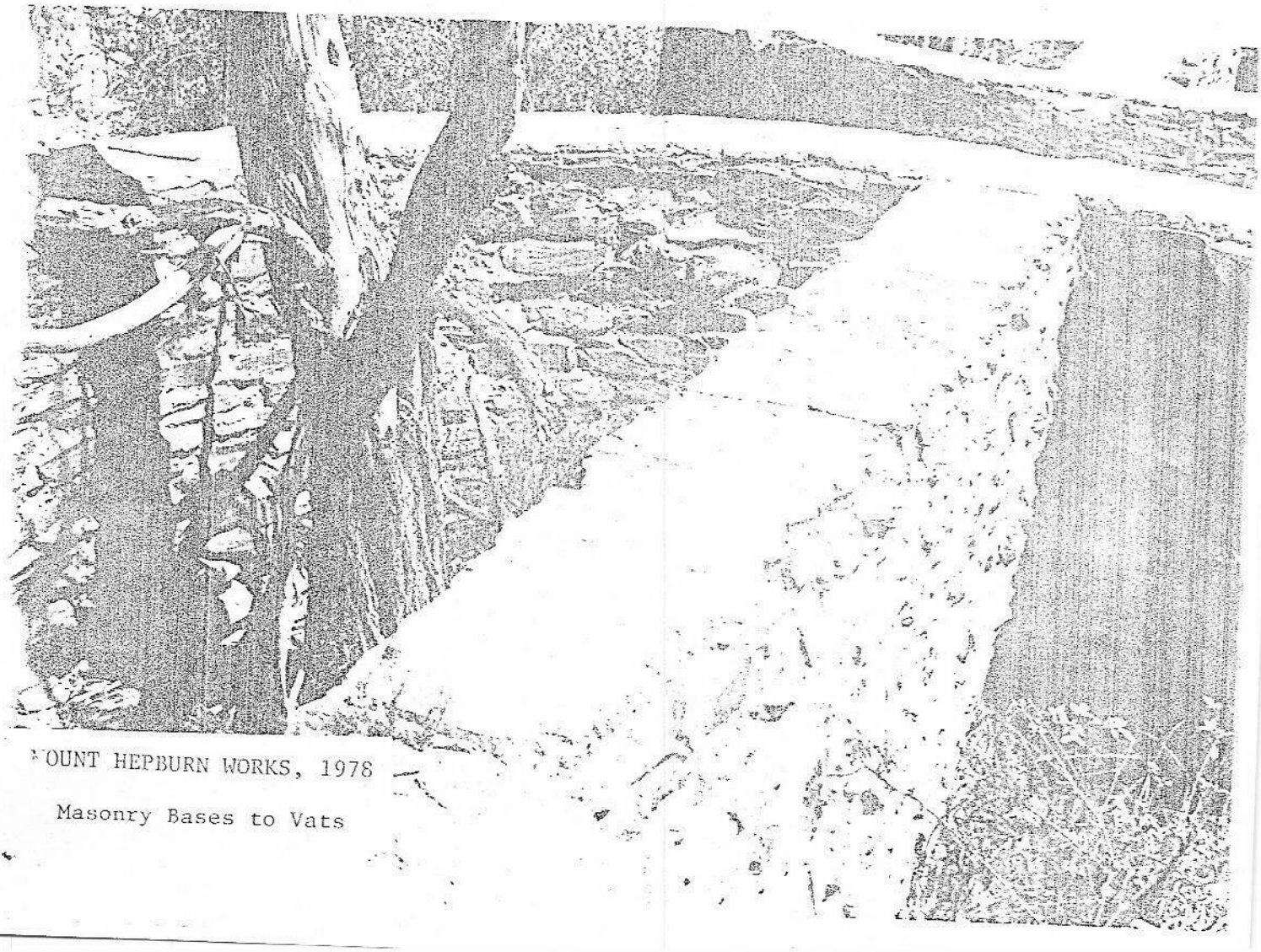
The Company is estimated to have treated in all some 8,000 tons of tailings from the Mount Hepburn battery, Ryans battery and other sources for a return of 3,200 ounces of gold, a recovered grade as earlier noted of 8 dwts. per ton.

Costs of operating were about fifteen shillings per ton of tailings and as a result the net income to the General Exploration Company approximated £5,200 less payments to the Mount Hepburn Company, Ryan Brothers and other vendors.

It is unlikely therefore that the General Exploration Company recovered much more than 50% of their capital investment.



MOUNT HEPBURN WORKS, 1978
Masonry Bases to Vats



MOUNT HEPBURN WORKS, 1978

Masonry Bases to Vats

Early in 1900, the General Exploration Company cried enough and sold their cyanide plant to the Allsop Brothers.

ALLSOP'S METALLURGICAL WORKS

Early in 1899, the Allsop Brothers who had been running the General Exploration Company's cyanide works at Tongio West went into business also on their own account.

They purchased initially, 1500 tons of tailings lying at the Livingston Battery site at Sunnyside and erected a small cyanide plant to treat them. The plant went into production in the latter half of 1899 and within a year had treated the whole dump for a return of about 850 ounces of gold.

Concurrently they recognised the opportunity to treat the metallurgically difficult ores and tailings of Cassilis, Tongio West and nearby gold-fields and, as a consequence, took up a works site adjacent to the General Exploration Company.

In September 1899, they made their first move and called tenders for the manufacture and delivery to their site at the Mount Hepburn of 25,000 bricks for construction of an ore roasting/desulphurising furnace.

The Allsop's had recognised the vital need to treat the pyritic ores of the district in a furnace prior to cyanidation. For some years then, considerable quantities of rich concentrates had been purchased and despatched elsewhere for treatment, for instance by Deeble for treatment at his United Pyrites Works at Bendigo and by J & H Lempriere for treatment in Germany.

Earlier, McCulloch & Ekberg had sought to hold the market in concentrates with their plant at Cassilis but had not met with success. The Warden had purchased and improved that plant but had still been unable to obtain more than a minor proportion of the market.

It was the Allsop's ambition to provide an adequate treatment works for the whole region. Skilfully they came to an arrangement with the Lempriere group to take over their local trade.

In early 1900, the General Exploration Company sold their cyanide plant to the Allsop Brothers and with the facilities bought via the Cassilis Company from the Mount Hepburn Company, they were to have a complete integrated metallurgical works at Tongio West.

The furnace was built inside the General Exploration Company's former extraction house between the southern complex of vats bases and the creek.

It was one of the largest ore roasting furnaces in Victoria being 50 feet long and 10 feet high and having twenty ravelling doors. Gases from the furnace passed initially through a 10 feet by 10 feet by 6 feet high condensing chamber where any escaping sand fines were recovered and thence passed along a 360 feet long ground flue to the base of the 60 feet high chimney-stack.

Antimony, Arsenic and other products were deposited along the length of the ground flue and were extracted through doors in the flue at every 20 feet. A large amount of sulphuric acid was also generated in the process with the result that upon contact with the moist external air the whole recovered depositions had the composition of wet mud. This material was reduced to a marketable product.

After roasting, the ore was withdrawn from the furnace, moistened and slaked lime added until freely alkaline. It was then treated with a weak caustic-soda solution and finally drained out.

The next process was cyanidation, the solutions being separated from the treated material by a filter cloth arrangement. Again the material was in cyanide solution for two weeks, as with the General Exploration Company's treatment but, differently, the gold was precipitated with the zinc shavings process and not electrolitically. This process recovered silver also and the bullion obtained was subsequently refined at the Allsop's laboratory in Armadale, Melbourne. The efficiency of the gold recovery process approached 95%.

The whole works at Tongio West commenced operations on 1st September, 1900 and in the first three months of operations treated 300 tons of concentrates from various sources such as the Democrat and United Brothers at Sunnyside, the Cornstalk and Good Friday at Bald Hills Creek, from various mines around Brookville and from Ryan Brothers battery at Tongio West.

While the works got under way at Tongio West, the Allsop's also contracted to treat the tailings of the Maude & Homeward Bound Company at Glen Wills and also the 30,000 tons of tailings of the United Brothers at Sunnyside.

For the Maude & Homeward Bound contract they moved their small plant from the Livingston Battery, whilst for the United Brothers contract they removed the bulk of the cyanide plant from Tongio West, enough they said to treat 1,000 tons per month, and still retain a small capacity of about 100 tons per month at Tongio West plant. A contract was let to Brumley & Ismay of Omeo to remove and re-erect the part plant from Tongio West and this was completed early in 1901.

The operations of the Allsop Brothers had developed rapidly, were a significant employer of labour and were profitable. The costs of roasting were between thirteen and fifteen shillings per ton, whilst the cyanidation was of the same order. With tailings around Sunnyside and Glen Wills containing values of over £2 and concentrates from there and the Cassilis - Tongio West area containing values of £6 and more, the Allsop's could pay well for their requirements and have a handsome margin for profit.

J.L. Allsop was manager at Tongio West,having sub-managers at Sunnyside and Glen Wills. F.W. Allsop ran the laboratory and general trading business at Armadale Place, Armadale.

In July 1901, at the point of great success with the business, J.L. Allsop met an untimely death at the age of 34 years, as a consequence of inhaling the poisonous gasses generated by the cyanide process at Tongio West.

In August, Mr. H. Blyth was appointed to manage the Tongio West works and T. Wilson the cyanide plants at Sunnyside and Glen Wills.

Although, following the death of J.L Allsop there were many months of tailings and concentrates supply available for the works at Tongio West, it is clear that the straightforward cyaniding operations at Sunnyside and Glen Wills were the major and growing arms of the Allsop enterprises.

By August 1901, the cyanide plant at Sunnyside, being that largely removed from Tongio West,was treating 800 tons of tailings per month and operations there on the United Brothers and with the smaller plant at the Maude appear to have continued for some years.

It is estimated that Allsop's works at Tongio West treated 2,500 tons of ore and concentrates from the region in the period 1900 to 1903 for a return of 5,000 ounces of gold. Of this no more than 200 tons for 150 ounces would have had its origin in the Mount Hepburn mine.

In 1904, the works were leased complete to the King Cassilis Company then operating the Mount Hepburn mine, for a rental of £200 per annum; an arrangement which continued through until 1906 when the rental was reduced to about £170. The arrangement was finally terminated in 1907 and subsequently the useful components of the works were removed to other sites.

ROBERT (BOB) STANLEY AT THE MOUNT HEPBURN

In April 1900, Robert William Stanley who had been an employee of A.E. Ball and had lived adjacent to the Mount Hepburn workings since 1893, applied for forfeiture of the Mount Hepburn Company Limited's lease 1859. This was recommended by the Warden and subsequently granted to Stanley.

Stanley it will be remembered was the occupier of land wanted by the Mount Hepburn Company in 1896 for erection of a store; a proposal not agreed to by Stanley, who retained occupation.

Stanley's application was made on behalf of himself, Richard Saxon, Edward Saxon, Peter Hansen, James Saxon and Henry Saxon.

As we will shortly see, Stanley made a mistake in his forfeiture application, a mistake that could well have cost him dear.

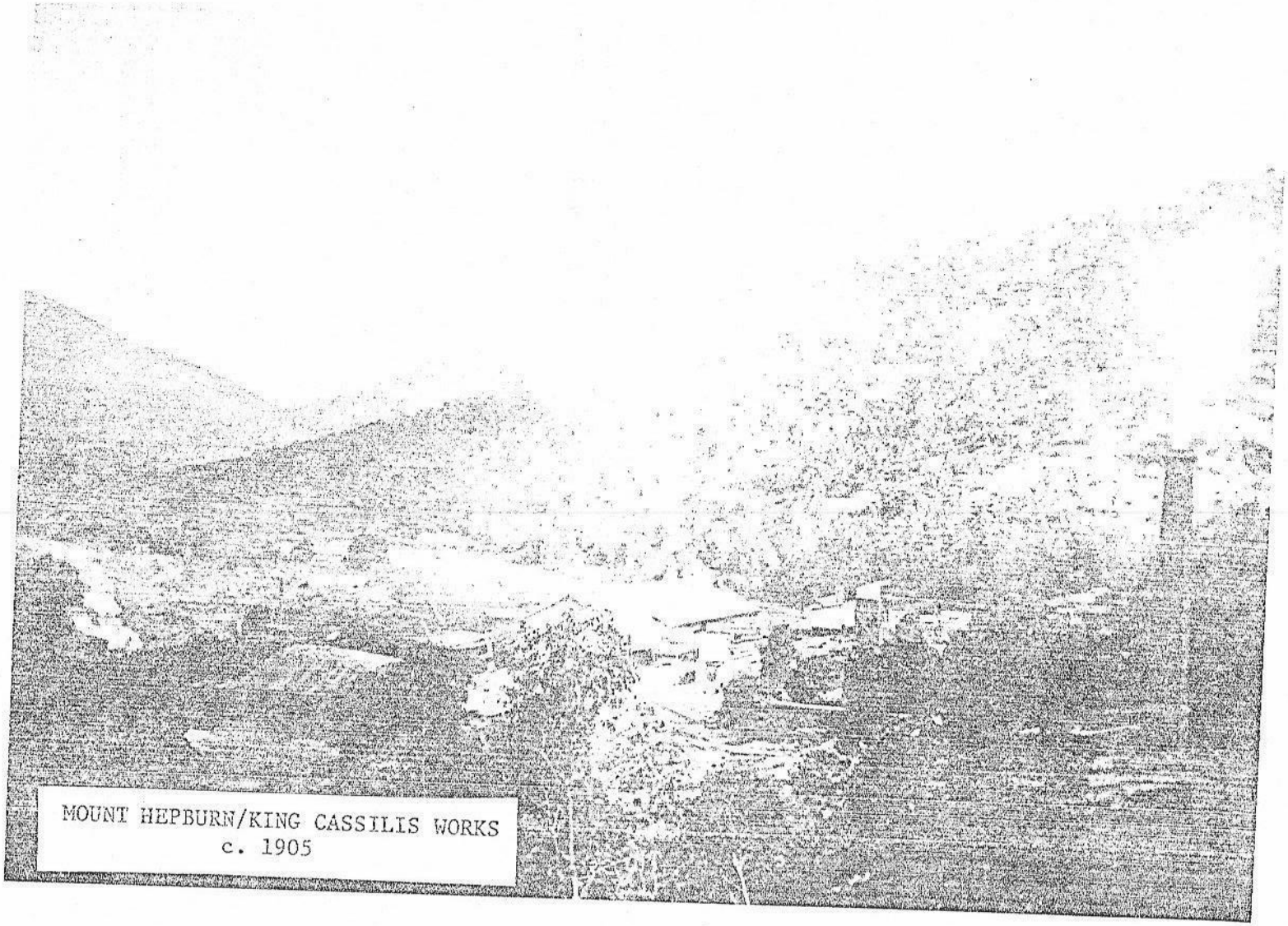
By September, Stanley and his party of five had mined almost 200 tons of ore. Their first crushing in early September at the Warden Company's battery in that month was 188 tons for a return of 5.5 dwts. free gold per ton, plus 90 tons of sands assaying 1 ounce 13 dwts.per ton, thus indicating a recoverable grade of around 1 ounce 1 dwt per ton of ore. The ore total head grade was estimated as 1 ounce 5 dwts. per ton.

This return received wide publicity and Tom Beck realised that Stanley had not obtained the ore from Lease No. 1859 but from Lease 1685 containing the Beehive and the old open stope workings. As a consequence Beck applied for the area formerly covered by Lease 1685, together with its water-race title.

The action of Beck resulted in considerable consternation and public indignation. On 24th January, 1901, Stanley applied to the Warden's Court at Omeo for the matter to be corrected explaining that he had inadvertently applied for forfeiture of the wrong lease in April 1900.

He stated that it was the ground of Lease 1685 that he had worked and now proven valuable at a cost of more than £500, and that the ground of Lease 1859 had never been tested by the Hepburn Company or himself and was of no interest. The Warden decided to recommend in Stanley's favour that Lease 1685 be granted to him.

Satisfied, Stanley and his group returned to their work but were shocked, as were the whole Omeo region community, when the Minister of Mines over-ruled Warden Holmes recommendation. In March, Stanley and his party had 26 tons crushed at the Warden for a return of about 4.6 dwts. free gold per ton plus concentrates.



MOUNT HEPBURN/KING CASSILIS WORKS
c. 1905

Public meetings to express indignation were held, and the Minister was accused of perpetrating a great injustice. At the request of the local member, Henry Foster, the Minister re-opened the case for review.

The Minister made it clear that his sympathies were with Stanley and suggested that the Beck & Stanley parties resolve the question amicably themselves. Obviously considerable pressure was put on Beck to withdraw and by the end of April 1901, agreement was achieved and at least 23 acres of the key lease 1685 became the tenement of the Stanley Party under the operating title of the Recovery Gold Mining Company.

By July, Stanley and Party had another 200 tons at the Warden Battery. Free gold recovery from this is believed to have been about 6 dwts. per ton, plus 50% concentrates of about 2 ounces per ton.

By the close of 1901 Stanley and Party had mined and had treated at the Warden Company Works, 500 tons of ore for a return of approximately 525 ounces of gold, including that in the concentrates.

Negotiations were underway with a Melbourne group for purchase of the mine and that same group were then contemplating purchase of Ryan Brothers battery also.

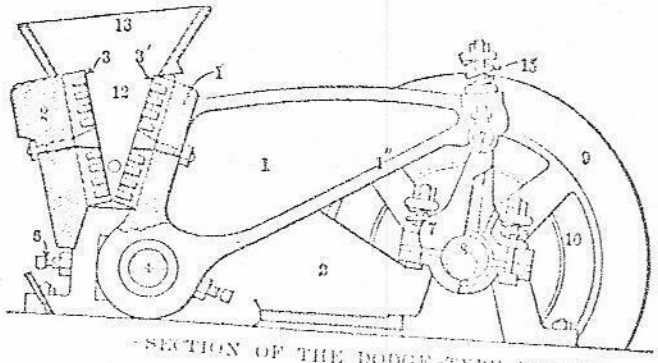
KING CASSILIS GOLD MINING CO. N.L.

The King Cassilis G.M. Company was incorporated in July 1902, with a nominal capital of £24,000 in 48,000 shares of ten shillings each.

There were six original subscribers to the share issue, each holding 500 shares. five of these were investors from Melbourne, but one was Donald Clark, the Director of the Bairnsdale School of Mines since 1890.

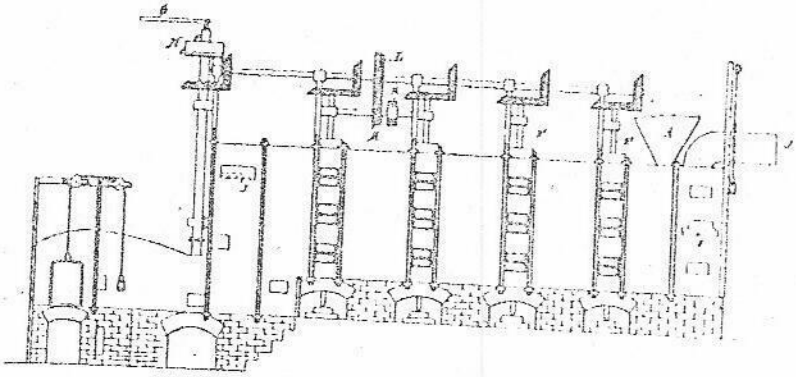
Donald Clark was a metallurgist of some fame in Australia, and in 1904 was to be the author of the widely read text "Australian Mining & Metallurgy". He was a regular contributor to the Australian Mining Standard, and other periodicals and newspapers, including most probably the Omeo Standard, but under a cloak of annonyminity. For many years, he provided an assay service for the Omeo region per media of an agency at the Omeo Standard's Office. He was a recognised specialist authority on the metalliferous deposits of East and North Gippsland and a regular visitor to the region's goldfields.

In 1901 he had carried out a specific appraisal of the ore treatment methods then being undertaken in the Cassilis - Tongio West area, including Allsop's. Although he was already well aware of the Mount



SECTION OF THE DODGE TYPE BREAKER.

DODGE-TYPE OREBREAKER



MERTON ROASTING FURNACE

Hepburn auriferous lodes, it appears probable that during this visit he saw a timely potential opportunity for a company investment based upon the work of both Stanley & Party in the mine and the Allsop Brothers in treatment.

Clark had taken a series of assays of the body that had been exposed by Stanley & Party in winzes sunk by them from the Mount Hepburn Company's upper tunnel level workings. This body which was up to 8 feet wide had, according to Clark. an average gold content of one ounce 5 dwts. per ton and seemingly consisted of more than 50% sulphide minerals, chiefly iron pyrites, pyrrhotite, and a little galena and copper.

Clark's report was the catalyst for formation of the Company, which purchased the Mount Hepburn tenements,by then of three leases totalling 102 acres in area,from Stanley & Party for £200 cash and apparently an issue of shares. Flotation of the Company on the Melbourne market followed rapidly and by August 1902, sufficient funds were in hand to commence work and the Mine Manager, W.M. Jenkins was on site.

The period from the latter half of 1902 until the close of 1903 was one principally of mine development.

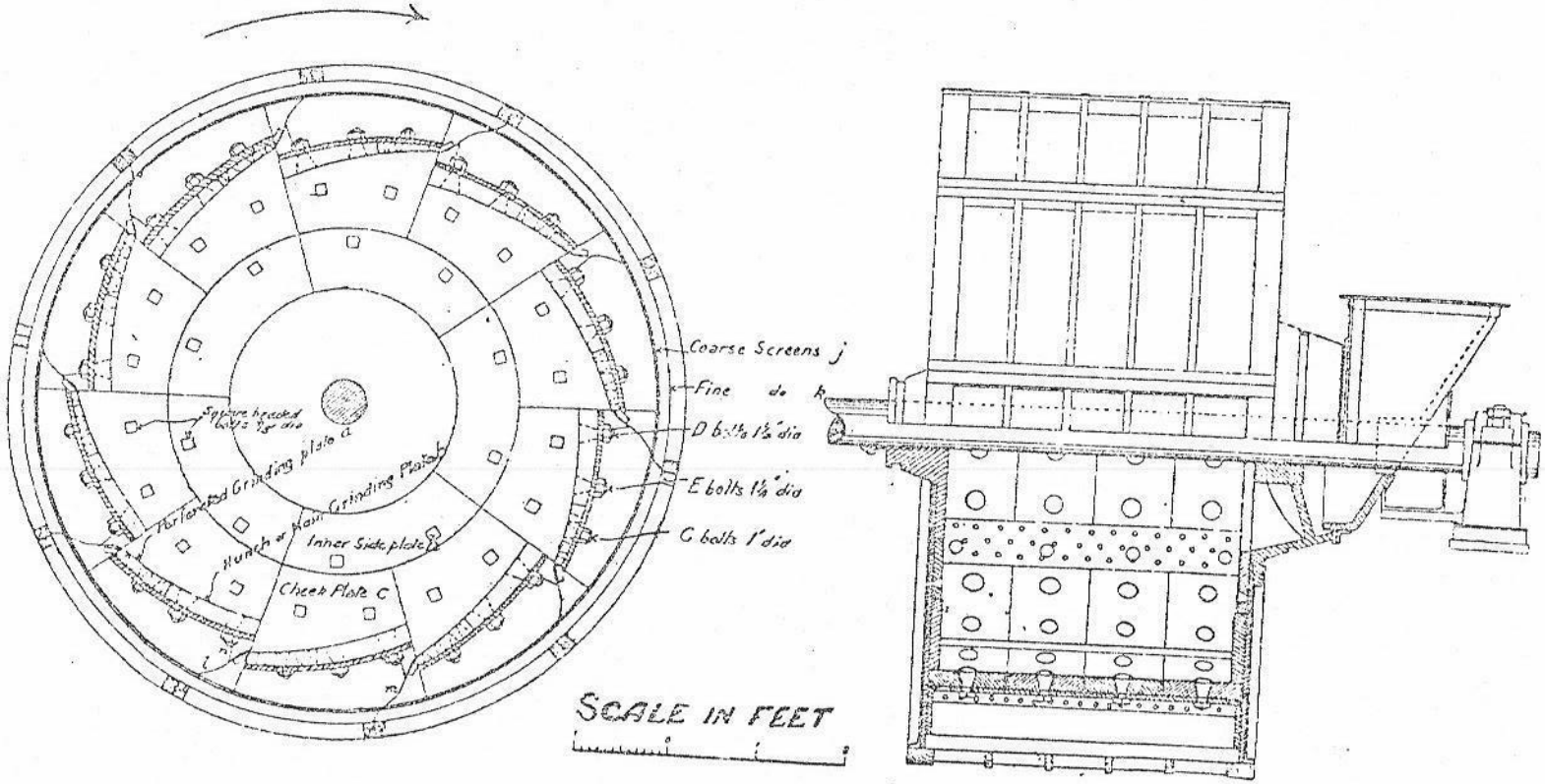
In September 1903, Jenkins was able to report encouraging developments that were indicating a bright future for the mine:

- The Magazine Shoot was 4 feet to 3 feet 6 inches wide and at least 160 feet deep returning assays of the order of 2 ounces per ton.
- The Big Shoot was as wide as 7 feet and returned assays of the order of 1 ounce 7 dwts. per ton.
- A new shoot from 2 feet to 4 feet wide had been driven on for 80 feet and it assayed from 10 to 18 dwts per ton.
- A trial crushing of 100 tons from the Magazine and Big Shoots was to be carried out at the Cassilis mine.

The results of the trial crushing were considered satisfactory, the Company receiving £46 for the free gold and £200 for the concentrates. Share prices of the Company on the Melbourne market rose and the Company proceeded into production and treatment.

Early in 1904 they concluded an agreement with Allsop to lease his Works for £200 rental per annum commencing on 1st April.

By June 1904, they had added necessary additional equipment to the works and commenced treatment operations. The arrangement then consisted of a Dodge rock-breaker crushing the ore to minus one inch size, which product was then dry fine ground in a Niagara, roasted, cyanided and the gold precipitated with zinc shavings.


Coarse Screens j
Fine do k
D bolts 1⅛ 1½" dia
E bolts 1⅛" dia
C bolts 1" dia
Square headed bolts 1" dia
Perforated Grinding plate A
Main Grinding Plate B
Inner Side plate E
Haunch
Cheek Plate C
SCALE IN FEET

KRUPP MILL

The cost of the additional rock-breaker and crusher circuit including installation approximated £500. The small size of the Allsop cyanide circuit restricted throughput to about 20 tons per week.

In the year 1904, 520 tons of ore was treated for a return of 686 ounces 16 dwts. of gold, plus silver recovered from the Bullion precipitate : a recovered grade of 26.4 dwts. gold per ton. On site tests indicated the recovery efficiency of the operation was approximately 93%.

Late in 1904, it was decided to instal a Merton's Furnace to replace use of Allsop's existing furnace. Merton's roasting furnace was to a design by T.D. Merton of the Spottiswoode Metallurgical Works, Spottiswoode (now Spotswood), Melbourne, and which had found ready acceptance in Australia, Britain and in Germany and other parts of Europe.

The Merton Furnace contained three hearths superimposed one above the other, each hearth being 23 feet long and 8 feet wide and one foot deep. The furnace had automatic ore delivery and mechanical rabbling. The advantages of the furnace were compactness, occupying a ground space overall of about 34 feet by 10 feet, simplicity of construction and working, large output and heat economy.

This new furnace appears to have been completed in the first half of 1905.

However, the first six months' operation in 1905 was not encouraging. In that period 550 tons was treated for a return of 354 ounces 5 dwts, a recovered grade of 12.9 dwts per ton.

For success, it was recognised that treatment plant throughput had to be significantly increased. Reserves were not the problem and the mining operation was of a cheap cost nature. The Merton Furnace was a step in the direction of increased and more economic treatment but now the Company experienced limitations in the capability of the Niagara crusher which was constantly breaking down and apparently unsuitable for use on the hard stone encountered.

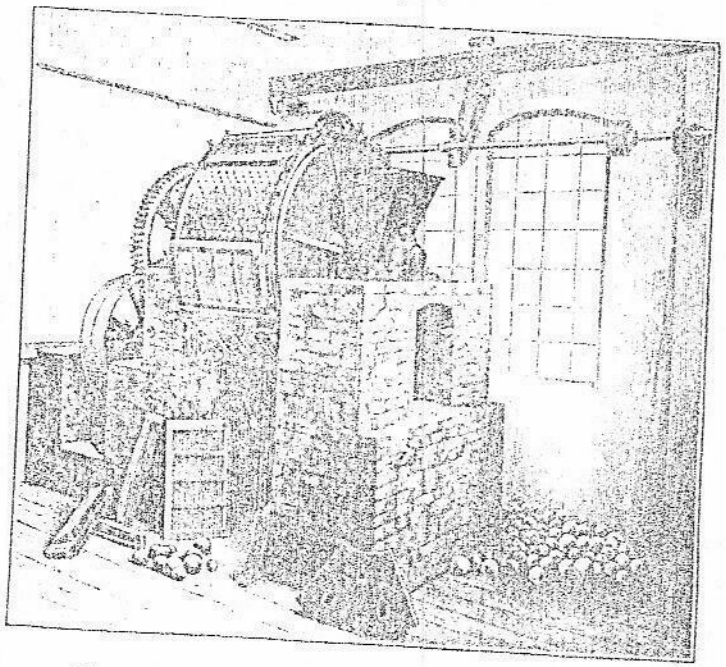
It was decided to replace the Niagara with a Krupp Mill, very similar to Ball's earlier Otis Mill. Krupp Mills were in use over the length and breadth of Australia and had been found very successful on hard stone, for instance at Mount Morgan where the average throughput per mill was maintained at 19 tons per day at a cost of one shilling and seven pence per ton, requiring only 10 horsepower for driving.

At the instigation of the new Manager, R.J.T. Brook, the Krupp Mill was purchased and installed early in 1906. The brickwork foundation for this mill can be recognised today, situated on the side of the southern group of cyanide vat bases.

Ball Mill No. 2, 3, 4 and 5

Ball Mill with the dust
casing removed and the grinding plates uncovered.

Figure 50a.



The Ball Mills No. 2, 3, 4 and 5, which differ from each other only by their dimensions, are supplied with spur-wheel gearing and a fixed and loose belt-pulley. As shown in the illustration, they are mounted upon a block of masonry.

Dimensions, weights and prices of the same will be found in the table, page 14.

KRUPP TYPE BALL MILL

SUPPORTED ON MASONRY

Brook also stressed the need, late in 1905, to increase the cyanide vat capacity and to make the handling less labour intensive. It will be recalled that the Allsop's had moved most of their vats and ancilliary gear including steam winches and other labour saving devices to Sunnyside by early 1901, to service their long term contract at the United Brothers mine.

1905 was a disappointing year for the Company. Although mine potential was looking well, the treatment was not; it was severely restricting production. In all, 890 tons only were treated for a return of 514 ounces 15 dwts. gold plus silver in bullion; a recovered grade of 11.6 dwts.gold per ton.

The Company entered upon 1906 with some feeling of success in the offing, but this was not to be borne out in practice. By the end of the first quarter they had a larger cyanide plant, a new mill operating and in association with the Merton Furnace, the treatment circuit as a whole looked well.

The returns for the first months of 1906, though low in throughput maintained a recovered grade of 11.2 dwts. gold per ton, but by September this was reduced to 5.6 dwts. per ton.

The August accounts tell the story, mining and treatment expenses of £2,360.9.11,in six months and receipts from gold sales of £529.1.11 only. The Company had had enough and ceased operations.

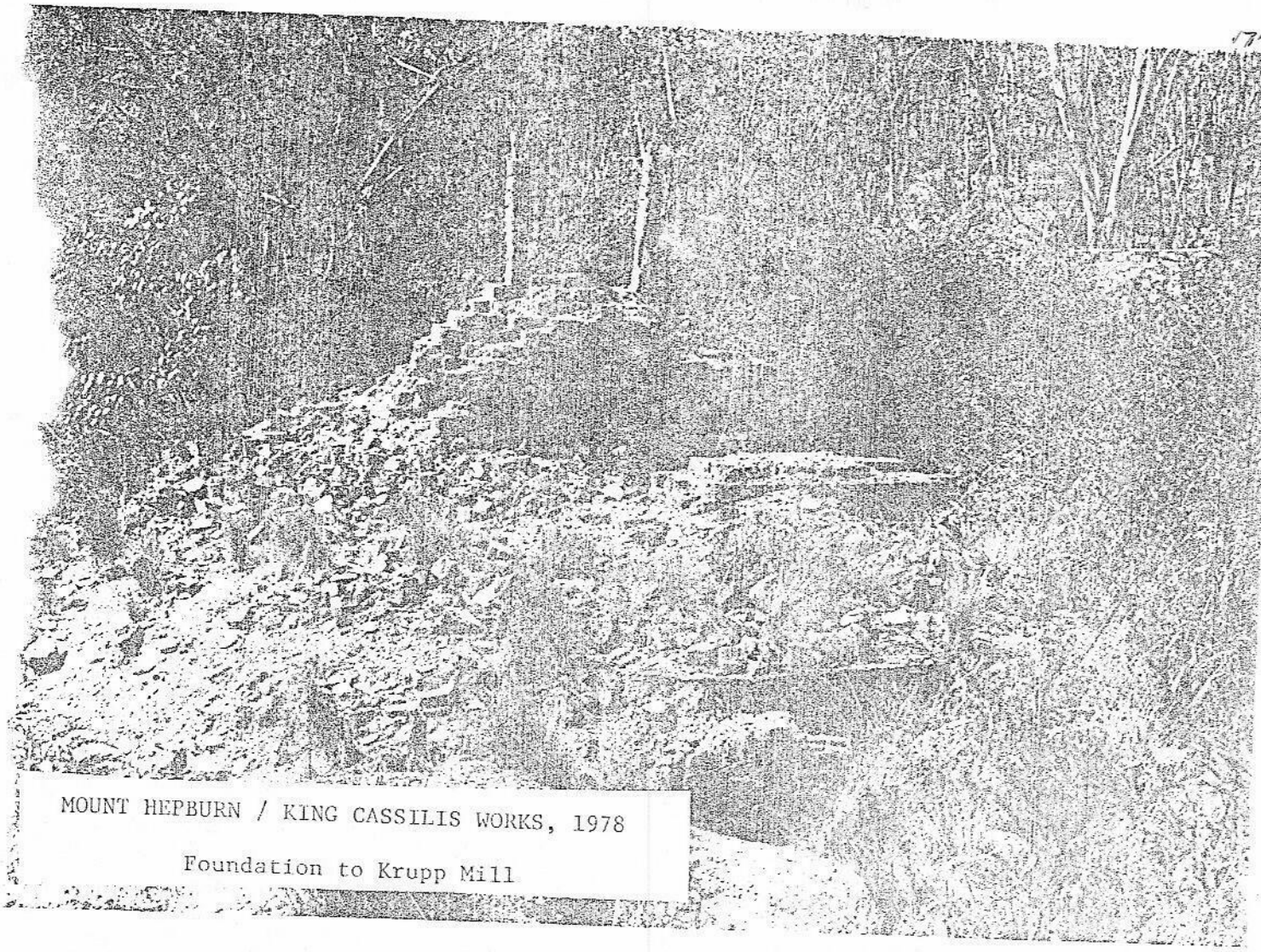
In all, in 1906 the Company had treated 480 tons for a return of 177 ounces 10 dwts. gold, a recovered grade on average of 7.4 dwts. gold per ton.

The story put around was that the treatment plant or the method of treatment was inadequate,but in the light of the new plant and the experience and knowledge gained by others earlier, for example Allsop, this appears to be nonsense. The plant as then installed was a standard successful layout on other gold mines in Australia.

Irrespective of the reasons for the poor performance or the potential for correcting any faults in mining, treatment or actual management, the Company did not recommence operations.

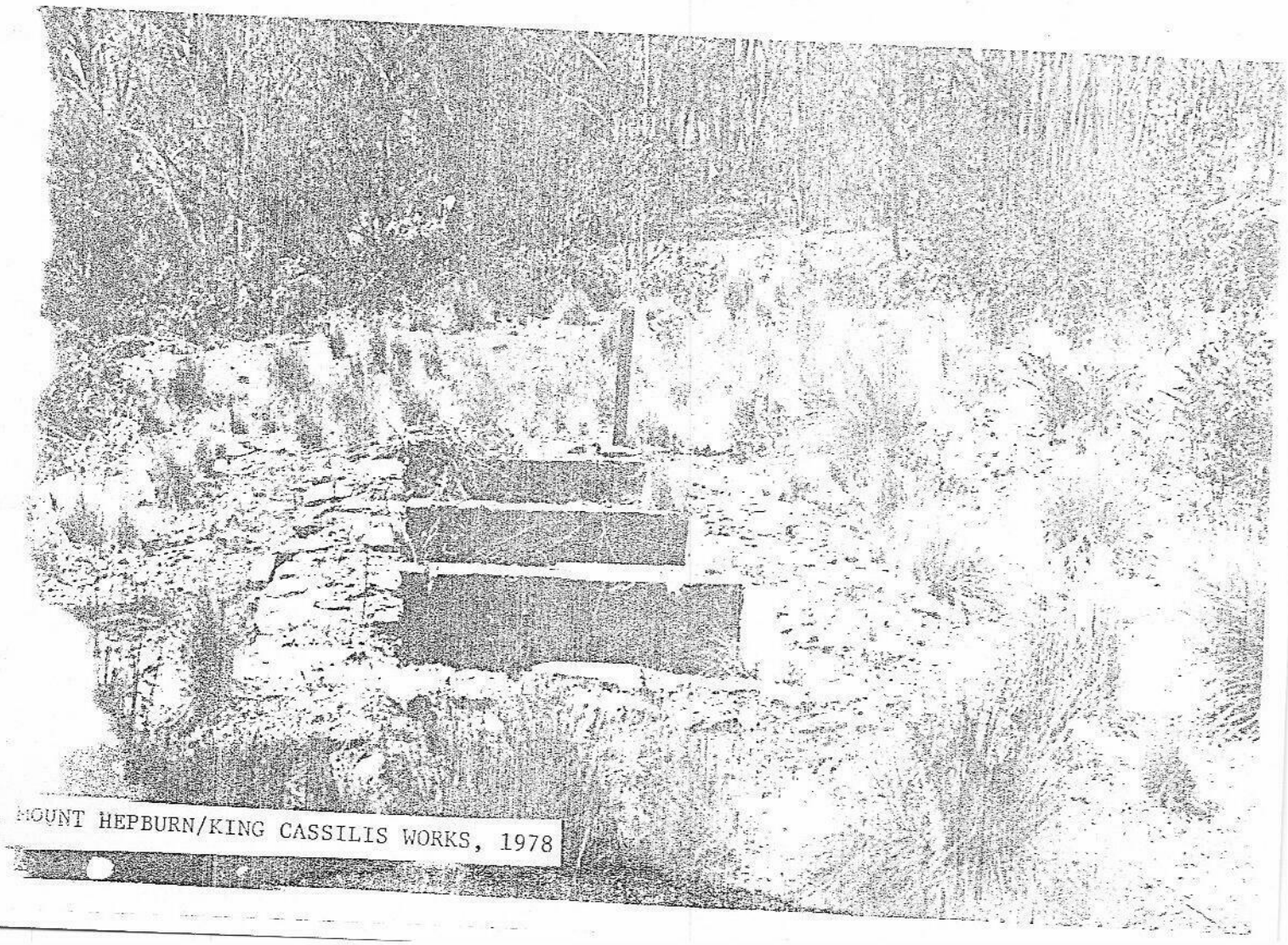
The problems of recommencement by the Company were probably compounded by Donald Clark's appointment as Director of the Bendigo School of Mines early in October 1906.

During its short career the King Cassilis treated at the site 1890 tons of ore for a return of 1,379 ounces 1 dwt. of gold, plus silver from bullion; a recovered grade of 14.6 dwts. gold per ton. In addition they had treated 100 tons at the Cassilis battery for a probable recovered grade including that in the concentrate of about one ounce per ton.



MOUNT HEPBURN / KING CASSILIS WORKS, 1978

Foundation to Krupp Mill



MOUNT HEPBURN/KING CASSILIS WORKS, 1978

SMALL PARTIES 1907 - 1925

Following the cessation of activities by the King Cassilis Company little productive activity took place for some years.

In 1908, cyaniding of various residues was undertaken, but it was not until 1911 when the mine was owned by A.G. Shaw that any attention was given to further mine exploration and development.

Shaw and subsequent tributers to him between 1912 and 1916, are believed to have operated on the Beehive Shoot and their production was:

Year	Tons	Gold Ounces	Operator/Tributor
1912	62	22	A.G. Shaw
1914	20	3.5	J. Davidson
1914	266	111	Hepburn Consols Synd.
1915	125	42	Hepburn Consols Synd.
1915	11	6	J. Davidson
1916	12	15	J. Davidson
	496	229.5	(Rec.Grade. 9.3 dwts/ton)

It is interesting to note that in 1911 it was necessary for the Omeo Shire Council to request that Allsop's, presumably, prevent pollutants discharging from the dumps around the works into the creek. It was reported that some of the stone from the mine was so heavily charged with arsenic that local landholders were crushing it, boiling it up with soda and using the resultant product to kill off trees and scrub on their properties.

By 1925 the property was clearly abandoned and all treatment and other plant had been removed.

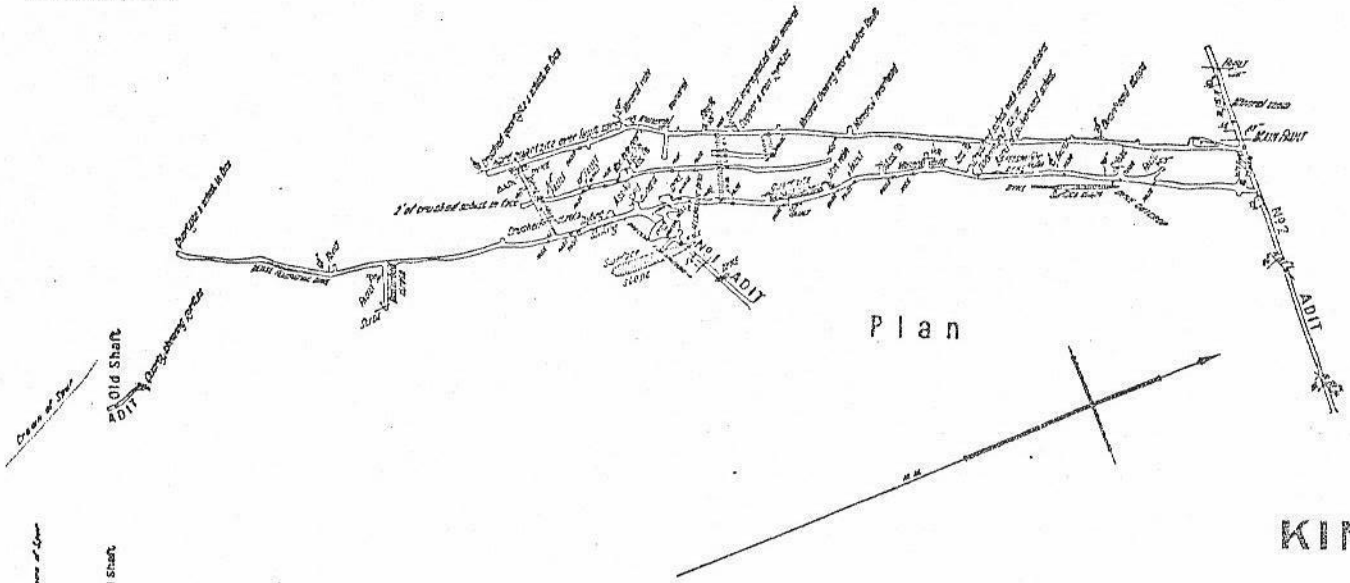
THE BAIRNSDALE SYNDICATE

In 1925, a syndicate from Bairnsdale pegged out leases over the Mount Hepburn ground and employed Mr. M.R. McKeown, mining engineer of Melbourne to report upon the prospect.

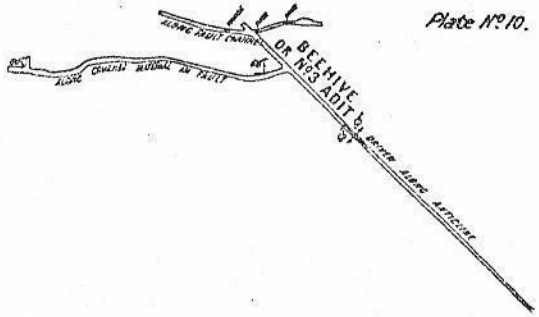
McKeown reported that two ore-bodies containing probable reserves of approximately 5,000 tons were accessible, and had a head value about 14 dwts gold per ton, and 2.3% arsenic. Total metallic mineral content approximated 51%.

He considered that concentrates high enough in gold could not be obtained by gravity concentration, that any attempt along those lines would result in a financial loss and recommended that the syndicate take no further action.

Plate No 10.



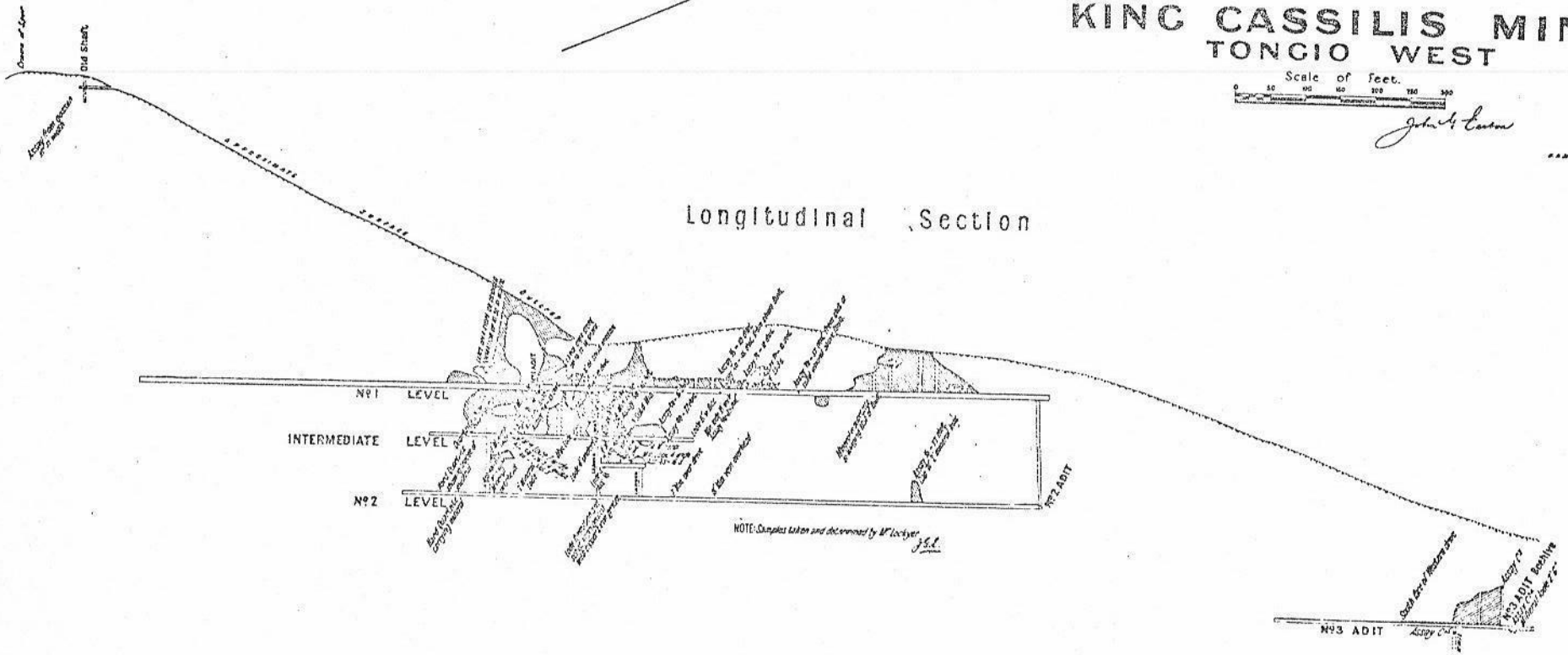
Plan



KING CASSILIS MINE
TONCIO WEST

Scale of Feet.

John A. Easton



Longitudinal Section

NOTE: Samples taken and determined by W Lockyer J.S.L.

NATIONAL GOLD MINING & MILLING CO. PTY LTD. AND THE CASSILIS SYNDICATE

In 1931, the National Gold Mining & Milling Co. Pty. Ltd. applied for and subsequently were granted three leases over the Mount Hepburn prospect and a Water Right Licence.

Leases 4996 and 5000 Gippsland of about 49½ acres covered the ground of the former Mount Hepburn consolidated leases (i.e. the old Smart Boys/Mount Hepburn and the Beehive leases). Lease 5055 Gippsland of a little over 7 acres covered the treatment works site and Water Right Licence 1231 covered the Mount Hepburn's old water race from Upper Swifts Creek.

The Company installed a small plant consisting of a five-head battery, Wilfley table, Phoenix-Weir table and a small hand charged reverberatory furnace and cyanide plant.

The operation was managed for the Company by N. Lockyer.

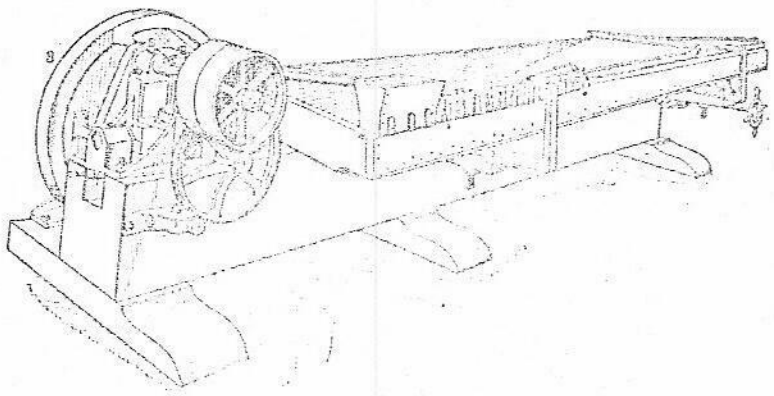
The Company treated 220 tons of ore for two parcels of concentrates, the first of 28 tons assaying 3 ounces 14 dwts. gold per ton, and the second of 4 tons assaying 2 ounces 10 dwts. per ton. This represents a recovery in the concentrates of 10.3 dwts. gold per ton of ore; a recovery efficiency of about 69% if the head grade was 15 dwts. per ton.

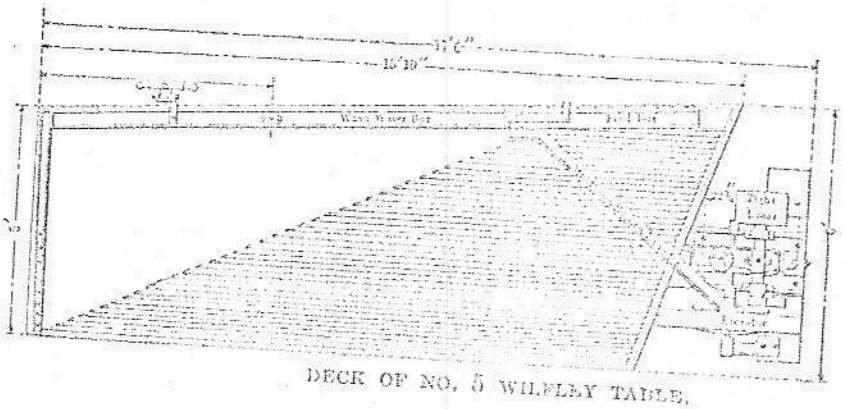
J.G. Easton of the Mines Department inspected and surveyed the mine, reporting that the average of 19 samples assayed by Mr. Lockyer was 22.7 dwts. per ton and that some thousands of tons of ore were in sight around existing openings, with good prospects of more to be located.

In April 1932, Sir Herbert Gepp inspected the mine and reported his preliminary opinion that the general grade of ore would be about 15 dwts. per ton, and some 5,000 - 10,000 tons were in sight. He recommended a systematic sampling programme, a geophysical survey and treatment tests to determine the best method of gold extraction, indicating that some attention should be paid to the flotation process.

The Cassilis Syndicate took an option over the property from the National Company and investigations were carried out for them by Sir Herbert Gepp and W.J. Rose as managers and J.T.Crouchman as mine manager.

Crouchman estimated that there were 6,500 tons of 15 dwts. ore in sight with a further 3,000 - 4,000 tons of probable ore, and this was confirmed by Loftus Hills. A five-ton sample of ore was tested at the Bairnsdale School of Mines by crushing, roasting and alternatively chlorinating and cyaniding. Chlorination was unsatisfactory and cyaniding required too much cyanide.





DECK OF NO. 5 WILFLEY TABLE.

WILFLEY TABLE

A geophysical survey was carried out by E. Blazey but although the results were not conclusive they did give indications of the existence of further ore - bodies.

F.L. Stilwell carried out mineragraphic examinations whilst flotation tests were carried out by Precious Metal Processes Pty.Limited of South Melbourne which showed that the material could be successfully and economically concentrated by flotation and the gold recovered by roasting, cyaniding and chlorinating.

In a final summary of the investigations, Sir Herbert Gepp reported that the mine would yield 10,000 - 12,000 tons of 15 dwt. ore without further development, and that a capital of £14,000 was required to, prove a further 10,000 - 15,000 tons of reserve, provide working capital and for erection of a mill consisting of crusher, classifiers, flotation unit, furnace, cyanide plant and chlorination plant. A profit of £1.10.0. per ton of ore was anticipated.

Under the terms of the option, the Cassilis Syndicate would have had to give a free one-sixth interest to the National Company and this together with the need to first prove additional reserves were given as the basic reasons for the Syndicate not exercising its option.

The National Gold Mining & Milling Company took no further action with their property and it was not until the latter half of the 1940's that interest in the property was rekindled.

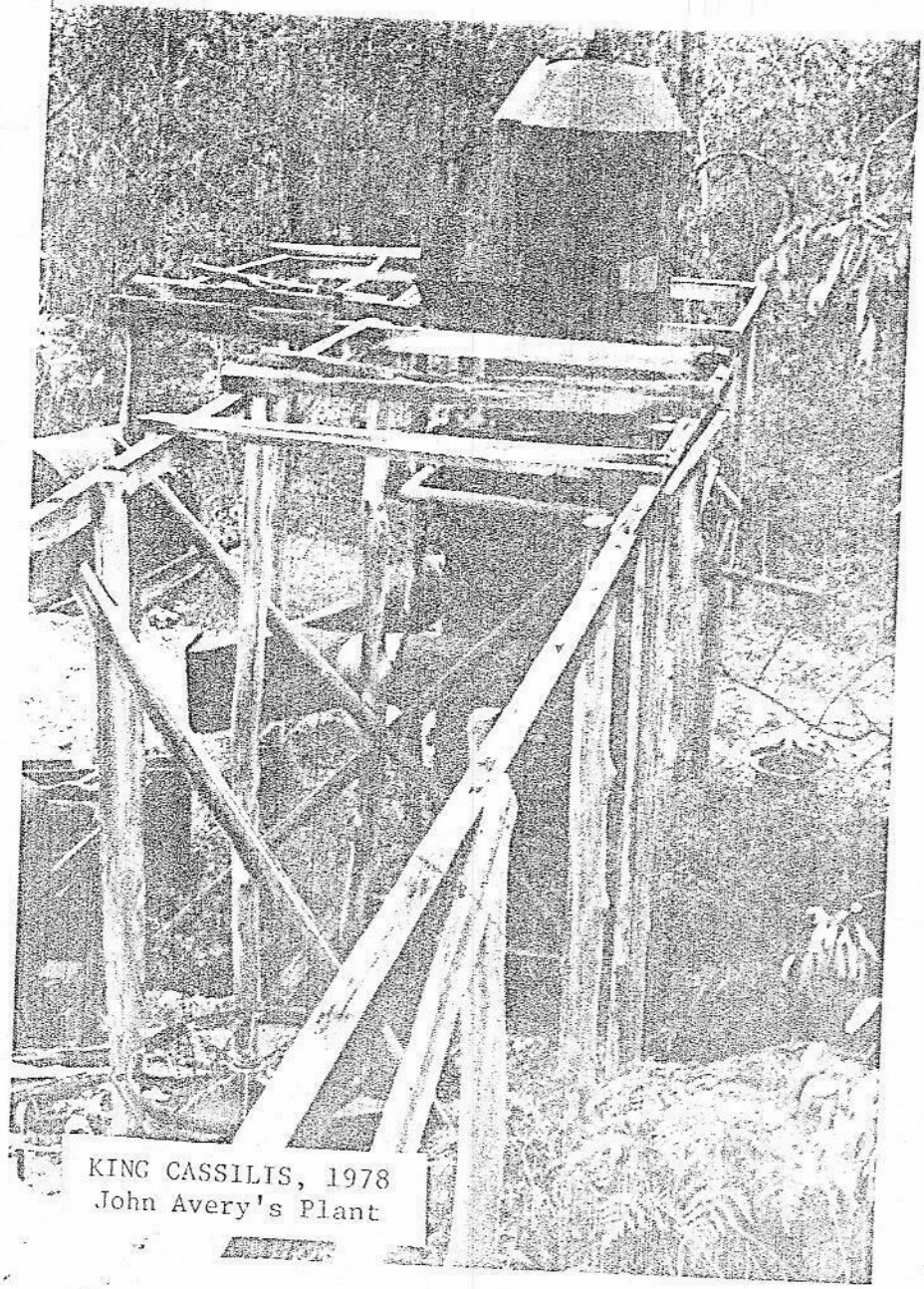
JOHN D. AVERY

In the latter half of the 1940's John David Avery took up the leases and water right licences previously held by the National Gold Mining & Milling Co. Pty. Ltd. The Leases have been renewed from time to time and at the present time they are as follows:

- Lease 5655 Gippsland of 25 acres 1 rood 28 perches expiring 3rd November, 1980. This approximates the ground covered by Ball's Beehive Lease.

- Lease 5654 Gippsland of 24 acres 0 roods 39 perches expiring 16th June, 1986. This approximates the ground covered by Ball's Smart Boys Lease which he later called the Mount Hepburn.

- Lease 425 in metric measure of 2.9744ha. granted as Machinery and Tailings Site and expiring 14th December 1990. This covers both Avery's plant site and substantially that of the former operators.



KING CASSILIS, 1978
John Avery's Plant

KING CASSILIS, 1978
John Avery's Plant

John David Avery is the son of John Avery who is mentioned in the report upon the Charlotte Spur Track as having operated the Lady McGregor Mine and Ball's Gum Forest Battery (formerly Peter Forsyth's) in the year 1906 and 1907. John Avery senior had also been heavily involved in the construction of the electric power supply to the Cassilis Mine from the Victoria Falls area on the Cobungra River.

Mr. Avery junior erected a small water jacketted blast furnace on site with a capacity of about 40 tons of ore per day. On a trial basis this has produced by re-smelting, copper mattes of a concentration of approximately 25:1 in which are contained the bulk of the gold and silver values. This furnace and Mr. Avery's mill remain on site at the present time. Mr. Avery estimates that 1,000 tons of selected high grade ore of a head grade of 30 dwts. per ton have been smelted for a recovery of 1,350 ounces of gold in the matte sold to Electrolytic Refining and Smelting.

PLANET GOLD LIMITED and TANGANYIKA HOLDINGS LIMITED

Under arrangements with Mr. Avery, both Planet Gold and Tanganyika Holdings have carried out extensive programmes of exploration over and around the Mount Hepburn prospect as well as a number of metallurgical and recovery test programmes.

PRODUCTION AT MOUNT HEPBURN/KING CASSILIS

Recorded and estimated production on the Mount Hepburn/King Cassilis mining and treatment complex is tabluated overleaf, with the exception of some trial crushings around 1890 and some minor cyanidation of tailings around 1900 for which no reasonable indication of quantity has yet been found.

In summary it is therefore estimated that:

- 14,500 tons of ore, more or less, have been mined from the workings on the Mount Hepburn/King Cassilis prospect for a return of 8,000 ounces of gold, representing an average recovered grade of 11 dwts. of gold per ton.

  If we assume that the average head of grade of all ore treated was about 15 dwts. per ton, the recovery was about 73% and about 2,900 ounces of gold has been lost in untreated and treated tailings almost all of which has been discharged into Swifts Creek.

YEAR	MOUNT HEPBURN/KING CASSILIS ORE TREATED						OTHER TREATED			REMARKS
	ON-SITE			OFF-SITE			ON-SITE			
	Tons	Gold Ounces	Grade Dwt/T	Tons	Gold Ounces	Grade Dwt/T	Tons	Gold Ounces	Grade Dwt/T	
1868/72	-	-	-	255	103.3	8.1	-	-	-	Crushed at Swifts Creek Battery
1888/92	-	-	-	?	?	?	-	-	-	Trials at Ryans & Rose Batteries
1893	-	-	-	18	18.8	20.9	-	-	-	Ball Beehive at Rose & Bald Hill Ck.
1893	-	-	-	1,000	425	8.5	-	-	-	Crushed at Ryan's (Ball)
1893/95	5,000	1,675	6.7	-	-	-	-	-	-	Otis Crusher (Ball)
1896	-	-	-	51	81	31.8	-	-	-	Giles & Party at Ryan's
1897	1,083	309	5.7	-	-	-	-	-	-	Mount Hepburn Co. Battery
1897	*(351)	205	11.8	-	-	-	-	-	-	Beehive tailings - small cyanide plant
1898	2,893	207	1.4	-	-	-	-	-	-	Mount Hepburn Co. Battery
1898/99	*(5,000)	1,125	4.5	-	-	-	-	-	-	Gen.Expl.Co.Cyanide 6.4 dwt tailings
1898/99	-	-	-	-	-	-	3,000	2,075	13.8	Gen.Expl.Co.Cyanide 19.7 dwt tailings
1900/01	-	-	-	500	525	21.0	-	-	-	Stanley & Party at Warden Works
1900/03	*(200)	150	15.0	-	-	-	-	-	-	Allsop Works
1900/03	-	-	-	-	-	-	2,300	4,850	42.2	Allsop Works
1903	-	-	-	100	100	20.0	-	-	-	Treated at Cassilis Battery
1904/06	1,890	1,379	14.6	-	-	-	-	-	-	King Cassilis Works
1908/ ?	?	?	?	-	-	-	-	-	-	Cyaniding tailings
1912/16	-	-	-	496	229.5	9.3	-	-	-	Shaw,Davidson etc., at Cassilis (?)
1931/32	220	113.6	10.3	-	-	-	-	-	-	National G.M. & M.Co.:Gold in concentrates.
1950's **	1,000	1,350	27.0	-	-	-	-	-	-	J.D.Avery smelting.
	12,086	6,514	10.8	2,420	1,483	12.3	5,300	6,925	26.1	

* Figures in brackets are tons of Mount Hepburn Tailings.

** Estimates of throughput and gold in matte sold provided by J.D. Avery. Selected high grade ore treated.

Of the 14,500 tons treated, a little over 12,000 tons was treated on site for a return of just in excess of 6,500 ounces of gold.

- Including concentrates and tailings purchased from other mines throughout the region, almost 17,400 tons have been treated on site for a return of almost 13,450 ounces of gold.

In addition to the income from gold, small quantities of other products were produced and sold at times, principally arsenic and silver.

OBSERVATIONS

The Mount Hepburn mine, because of its apparent potential for low cost, high throughput mining has attracted the attention of a great number of parties over the years.

Although its production is by no measure large on a statewide or even regional basis, it was nonetheless, the third largest producer of gold in the Cassilis - Tongio West - Gum Forest - Brookville area.

The only larger producers were the Cassilis Gold Mining Company in Powers Gully and the Perseverance/Scots Perseverance near Brookville (Sheepstation), the Cassilis producing 93,385 ounces of gold from 114,044 tons excluding the production of prior operators, and the Perseverance group producing about 8,500 ounces of gold from 16,500 tons more or less.

The significance of the subject site however enhanced by the custom treatment operations carried on there by the General Exploration Company and Allsop's.

The nature and form of the lodes at Mount Hepburn certainly attract interest and thought.

However, the observer's imagination is really stimulated by the interesting relics and constructions remaining on site and related to the great variety of ore reduction and treatment methods used there, which have included almost all methods other than chlorination and flotation.

~~5055~~ ~~5485~~. ~~5595~~.

PLAN OF AREA APPLIED FOR ON LEASE No. ~~5055~~ ~~5485~~. ~~5595~~.

Under the Mining Leases Regulations

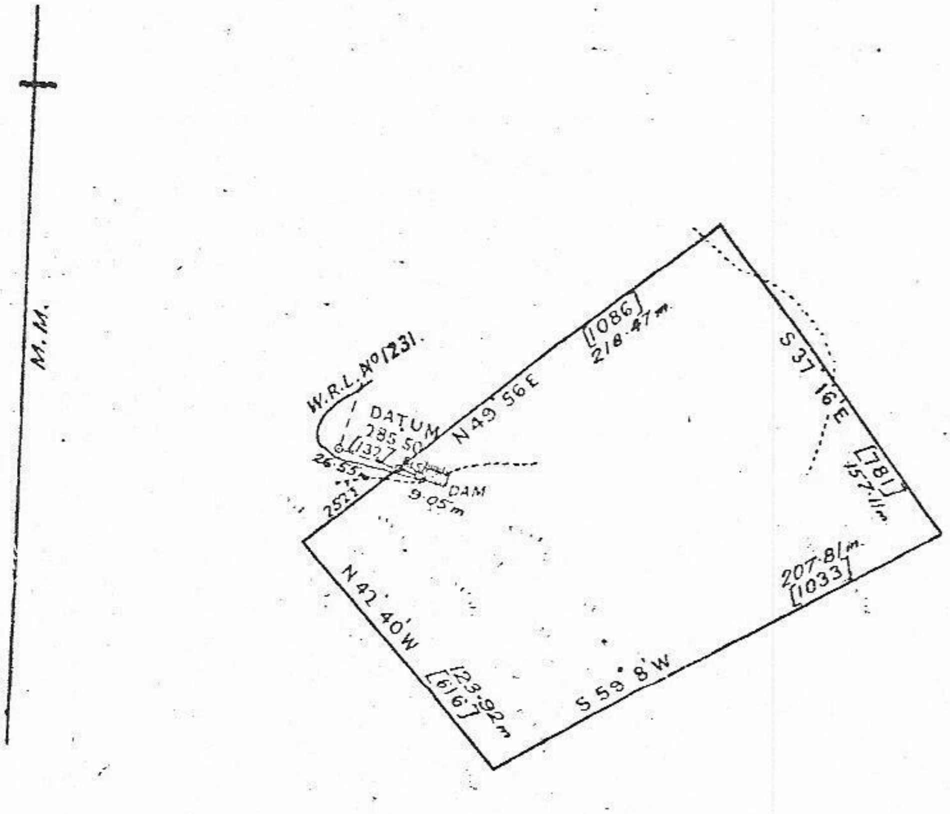
By National G.M. & Milling Co

No M.L. 425.

MINING DISTRICT OF GIPPSLAND

ARISH OF TONGIO–MUNJIE WEST COUNTY OF DARGO

AREA 2·9744 ha



I hereby certify [illegible] block of land represented by this Plan; that the [illegible] perfect [illegible]; that the bearings are taken from the [illegible] on the Plan; that the boundaries have [illegible] in accordance with the [illegible] paragraph of the printed instructions [illegible] October, 1882; [illegible] connected with the nearest available fixed survey mark [illegible].

Date 14 – 6 – 32

L. V. Brown, Mining Surveyor.

Identical with No. 5000 void
" " 5468 "
" " 5579
5654

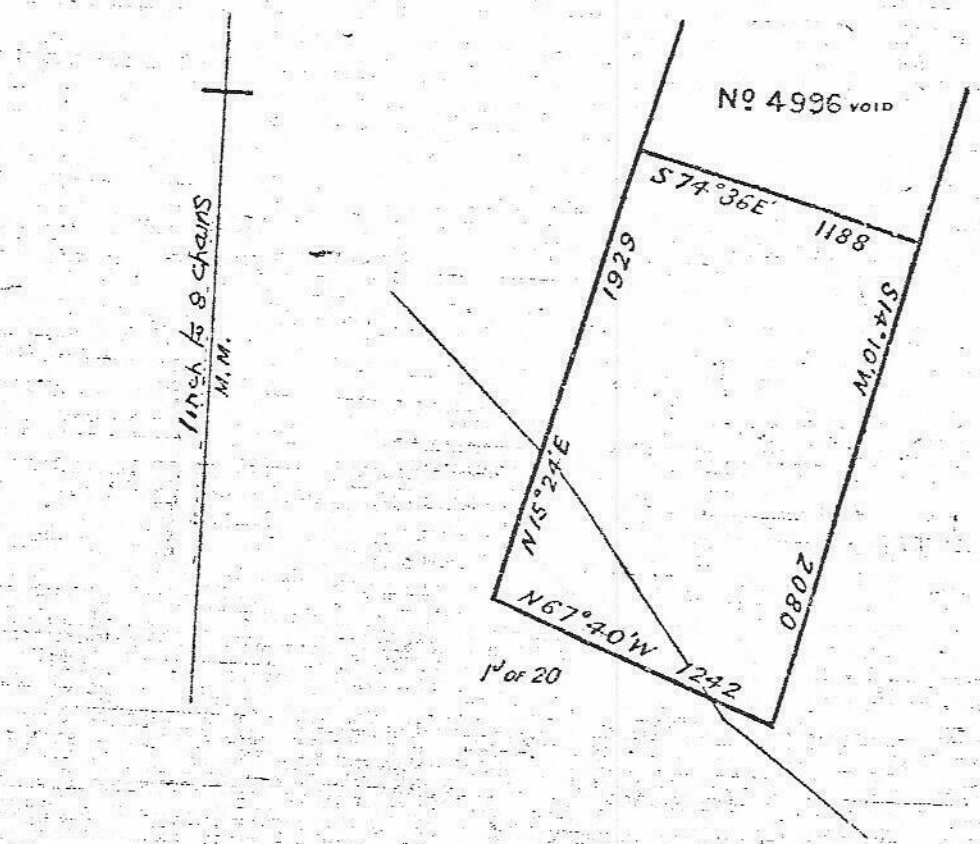
N [redacted] IPPSLAND

Parish of Tongio-Munjie West County of Dargo

Mining District of Gippsland Area 24.0.39 A. R. P.

Crown Land

Private Land (Solid 50ft).



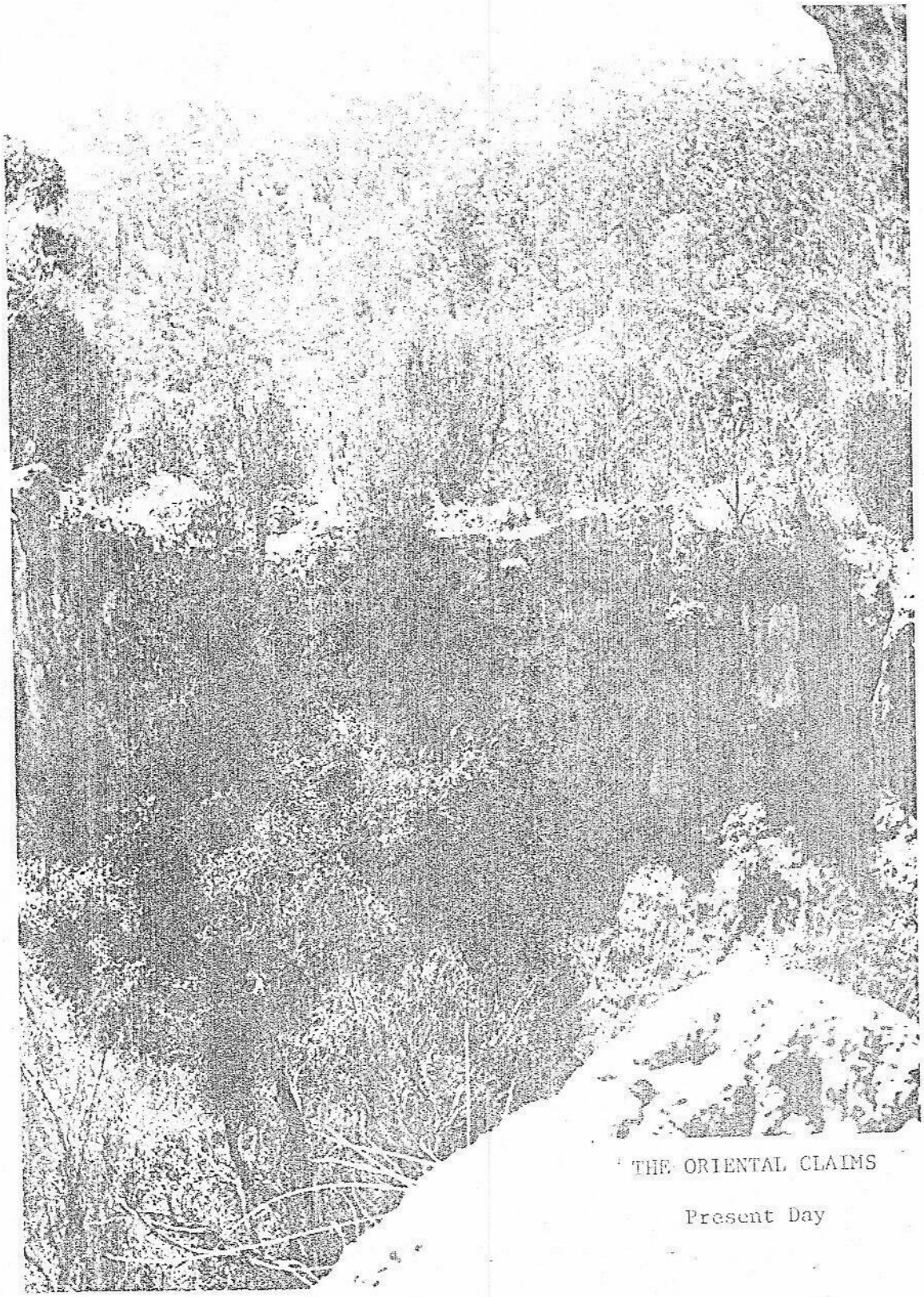
THE ORIENTAL CLAIMS

An historical review and appreciation of the alluvial workings at the Oriental Reserve.

****

John B. Griffiths

Axedale Mining Co. Pty. Ltd.



THE ORIENTAL CLAIMS

Present Day

INTRODUCTION

Occupying what is probably an ancient tarn or mountain lake at Pioneer/Dry Hill at the junction of Livingstone Creek and Dry Gully Creek, is a deposit of gravels and alluviums up to 100 feet or more in thickness, which except for occasional layers is gold bearing throughout to an unusually high order.

The profitable operations of both Chinese and European miners on the deposit for a period of fifty years, more or less, have left a feature of considerable historical and physical interest and splendour.

The common name, the Oriental Claims, is derived from the operations of one of the number of groups that occupied the ground, that is the Oriental Sluicing Company, which curiously enough was owned and operated by five miners, each of whom was of European extraction.

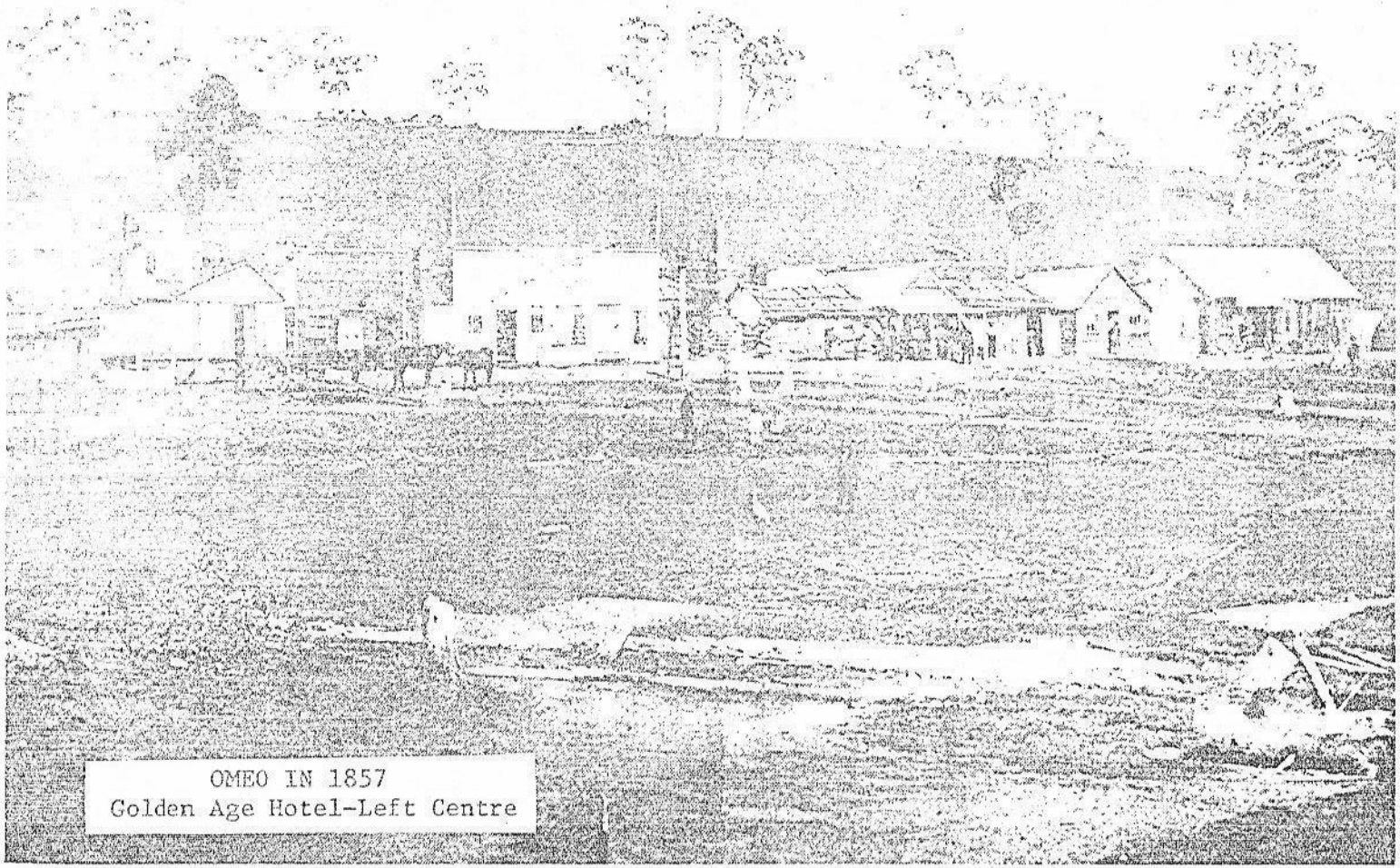
THE FIRST DIGGINGS

The identity of the first person to actually find gold in Livingstone Creek is unclear and may well always be a point of contention.

Richard Mackay, the chronicler of Gippsland goldfields events recorded that the first payable gold was discovered in Livingstone Creek in 1850. To support this suggestion there is a report in the Gippsland Guardian of late 1858 that a party of Americans had been sluicing successfully at Livingstone Creek for nine years, and had then gone home, but this could well be a misinterpretation of the knowledge that four Californians had been working in Snowy Creek, a tributary of the Mitta Mitta, in late 1852 or early 1853.

What one can be sure of is that the Reverend W.B.Clarke, a geologist as well as a cleric, had been sent out by Governor Fitzroy in 1851 to prospect the southern area of New South Wales and in the latter half of that year did find gold in Livingstone Creek and confirm his earlier forecasts of a goldfield to be found in the region.

In November 1851, Joseph Day, a station superintendent at Omeo, sent advice to Alberton of a goldfield being found and provided also a sample of the gold. Early in 1852, Goldfields Commissioner W.H.Smythe wrote that Day, though he called him George Day, had found the first gold at Omeo. Thomas Shean went with others to Day's discovery site and also obtained gold there.



OMEO IN 1857
Golden Age Hotel-Left Centre

INTRODUCTION

Occupying what is probably an ancient tarn or mountain lake at Pioneer/Dry Hill at the junction of Livingstone Creek and Dry Gully Creek, is a deposit of gravels and alluviums up to 100 feet or more in thickness, which except for occasional layers is gold bearing throughout to an unusually high order.

The profitable operations of both Chinese and European miners on the deposit for a period of fifty years, more or less, have left a feature of considerable historical and physical interest and splendour.

The common name, the Oriental Claims, is derived from the operations of one of the number of groups that occupied the ground, that is the Oriental Sluicing Company, which curiously enough was owned and operated by five miners, each of whom was of European extraction.

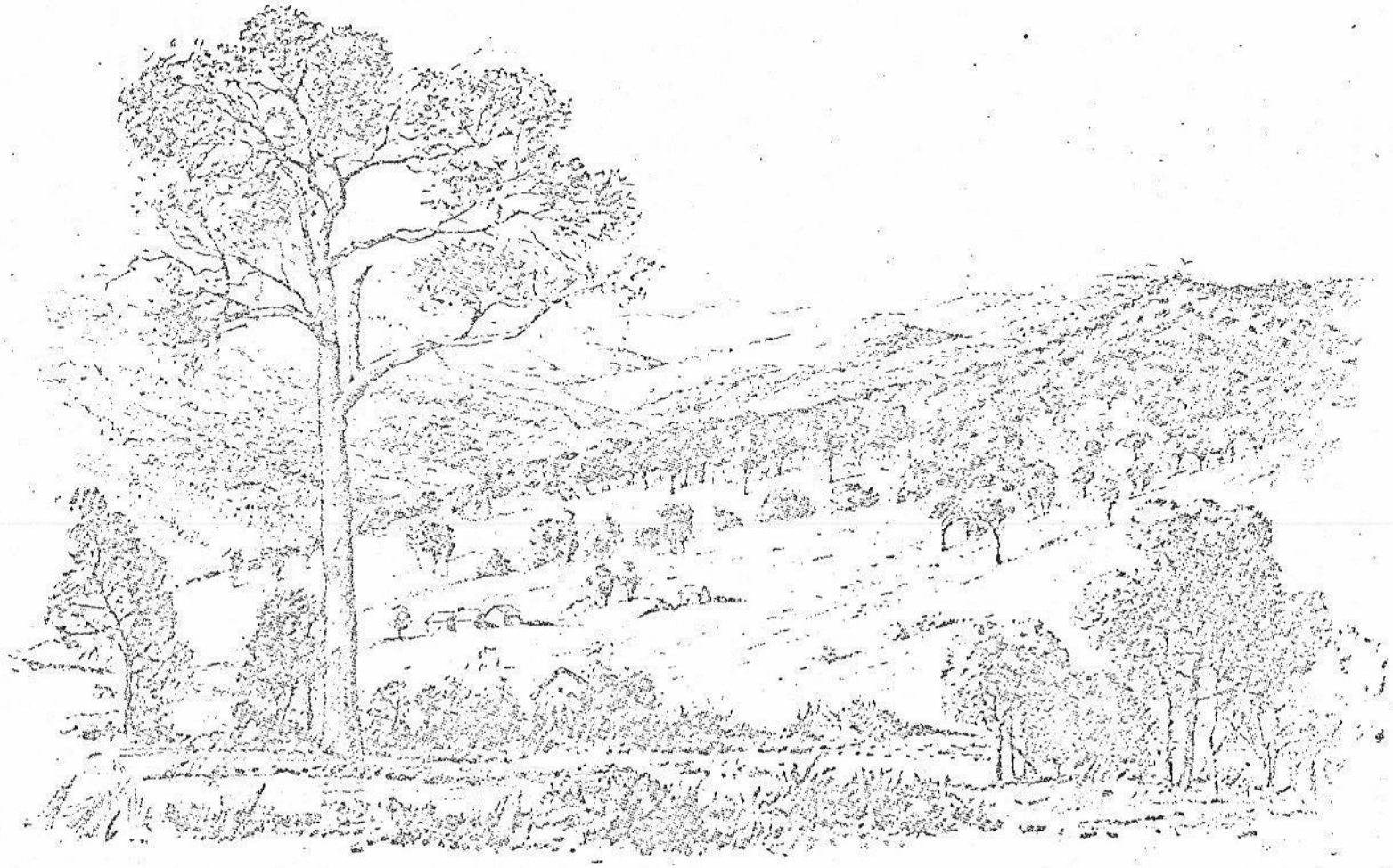
THE FIRST DIGGINGS

The identity of the first person to actually find gold in Livingstone Creek is unclear and may well always be a point of contention.

Richard Mackay, the chronicler of Gippsland goldfields events recorded that the first payable gold was discovered in Livingstone Creek in 1850. To support this suggestion there is a report in the Gippsland Guardian of late 1858 that a party of Americans had been sluicing successfully at Livingstone Creek for nine years, and had then gone home, but this could well be a misinterpretation of the knowledge that four Californians had been working in Snowy Creek, a tributary of the Mitta Mitta, in late 1852 or early 1853.

What one can be sure of is that the Reverend W.B.Clarke, a geologist as well as a cleric, had been sent out by Governor Fitzroy in 1851 to prospect the southern area of New South Wales and in the latter half of that year did find gold in Livingstone Creek and confirm his earlier forecasts of a goldfield to be found in the region.

In November 1851, Joseph Day, a station superintendent at Omeo, sent advice to Alberton of a goldfield being found and provided also a sample of the gold. Early in 1852, Goldfields Commissioner W.H.Smythe wrote that Day, though he called him George Day, had found the first gold at Omeo. Thomas Shean went with others to Day's discovery site and also obtained gold there.



VIEW DOWN VALLEY OF LIVINGSTONE CREEK FROM HILL ABOVE CAMP RESERVE, 1864.

192

THE PIONEER CLAIM: 1858 - 1883

The workings in Dry Gully during 1856 and 1857 were confirmed to minor operations carried out in the creek bed and on the banks principally by cradle. By 1858, probably twenty to thirty miners were in Dry Gully and its immediate environs, including seven Chinese miners who had come down from Snowy Creek.

Amongst those working at Dry Gully in 1857 were Edward D'Arcy Fitzgerald, George B. Hamilton and Duncan McRae.

Fitzgerald was one of the first Californian miners on the Omeo diggings, and had arrived there with George Hamilton, Jess Timmins and David Syme. David Syme was to become, with the Age newspaper, probably the most successful and respected journalist in Australia. Fitzgerald was to be elected to the first Omeo Shire Council in 1873.

Fitzgerald, Hamilton and McRae must have been men with more than the diggers normal nature of enterprise for they recognised the auriferous nature of the ground forming the adjacent Pioneer/Dry Hill, at the junction of Livingstone Creek with Dry Gully and Mountain Creek.

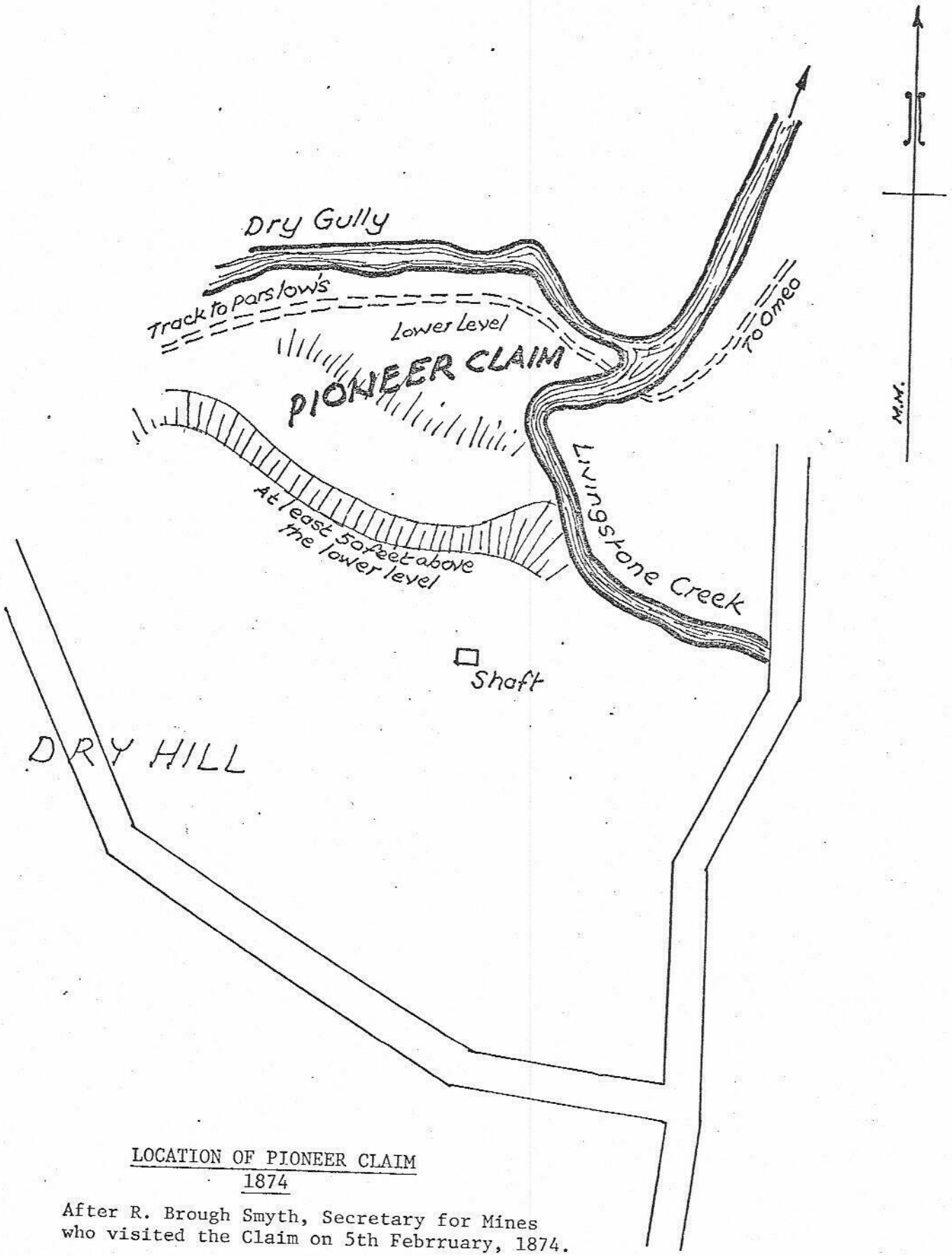
In 1857 they took up claims on Pioneer Hill and by 1858 were working as a co-operative party, ground sluicing the property that quickly became known as the Pioneer Claim.

Thus was the start of alluvial sluicing operations second to none in Gippsland, which were to continue albeit under changing names and proprietors for over fifty years and which were to encourage the enterprise also of others nearby, for instance in Bloomfields Gully.

The workings probably occupy the bed of an ancient tarn or mountain lake, resting upon a bedrock of mica schist. The gravels and alluviums of the deposit are up to 100 feet or more in depth and, except for occasional layers, are to varying degrees auriferous throughout.

At intervals, there are so-called false bottoms of white gravelly wash somewhat free of the boulders found throughout the full depth, and at these levels the deposit has been found to be more highly auriferous.

Suggestions have been made that the gold in the deposit has been derived from denudation of the auriferous contact quartz lodes found to the west only of Livingstone Creek, for example at the Polar Star and Gambetta mines in the Powers Gully area of Dry Gully. Some minor quartz reefs have been found in closer proximity to Pioneer/Dry Hill.



LOCATION OF PIONEER CLAIM
1874

After R. Brough Smyth, Secretary for Mines
who visited the Claim on 5th Febrruary, 1874.

In order to facilitate the treatment of greater volumes of ground and maintain reasonable continuity of operation they secured additional water supplies by diverting water through races probably from both Mountain Creek and its minor tributories and from the Livingstone.

There appears to have been considerable arguments over water-rights at the time, between the old French Company of France, Champagne & Party the constructors of the Frenchmens Ditch and the Pioneer/Dry Hill party.

The additional supply of high level water allowed the group to change their operation from tomming, ordinary ground and box sluicing to one of hydraulic ground and box sluicing, hydraulicking with a pressure hose, an operation that they had implemented by mid-1873. This operation was much admired by Sir George Bowen, the Governor of Victoria, J.J. Casey the Minister of Lands, A.J. Skene the Surveyor-General and R.Brough Smyth the Secretary for Mines, during their visit in February 1874.

Fitzgerald and his partners were the first in the Omeo district to undertake hydraulicking. Curiously, although by the end of 1873 there were two hydraulic hoses operating in the region it was not until 1886 that the number increased when the Oriental Sluicing Company installed one.

At the time of that vice-regal visit, the faces being worked on the Pioneer Claim were up to fifty feet high. Fitzgerald and his partners had carefully terraced their workings to provide a clear outfall of waste into the creeks.

There is a suggestion that in the 1860's the proprietors of the Pioneer Claim had found quartz veins higher up Dry Hill for in 1865 they applied for a quartz mining lease, No. 534 Beechworth, of a little over twenty-four and one-half acres, which was granted to them in early 1866 under the name of the United Quartz Mining Company. This may well have been the first mining lease granted in the Omeo area, and according to Bailliere's Gazetteer of 1865, was commonly termed the Pioneer also.

Interestingly, Brough Smyth during his visit to the Pioneer Claim in 1874 noted a shaft a little to the north of the alluvial workings and this may well have a working associated with the Lease 534.

The well known Mining Surveyor O.P. Whitelaw noted in 1879 that the faces being worked at Dry Hill varied from twenty to fifty feet high and were not worked to bedrock which he suspected could be sixty feet below. He considered that there was a strong likelihood of an extensive deep lead being found following the western bank of Livingstone Creek.

THE PIONEER CLAIM

1868

To Fitzgerald, Hamilton and McRae, the Pioneer Claim had been a rewarding enterprise. The ground value had averaged in excess of ninepence per cubic yard throughout, that is in excess of 5 grains or one-fifth dwt. gold per cubic yard.

Such a value would have been very profitable. Many sluicing companies operated successfully and paid dividends on grades ranging between one-tenth and one-quarter dwt. per cubic yard. The large works near Mitta Mitta Township appear to have regularly worked ground returning less than one grain per cubic yard.

In 1883, the working proprietors of the Pioneer Claim felt it was time to call a halt and sold it for £1,000 to a Chinese Co-operative party.

It is estimated that between 1858 and 1883, 7,500 ounces of gold were produced from Fitzgerald & Co's Pioneer Claim.

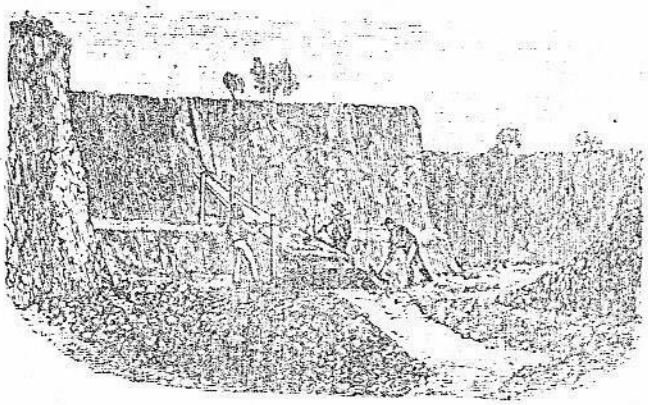
With interest one notes that large amounts of land around the slopes of Dry Hill and up the western side of the Livingstone Creek valley were taken up for agricultural purposes by Fitzgerald principally and to a lesser degree by Hamilton and McRae. Such ownership by themselves of freehold land also had the advantage of reducing the potential for conflict with landowners in respect of both water race entitlements and potential mining ground.

THE ORIENTAL SLUICING COMPANY: 1876 - 1888

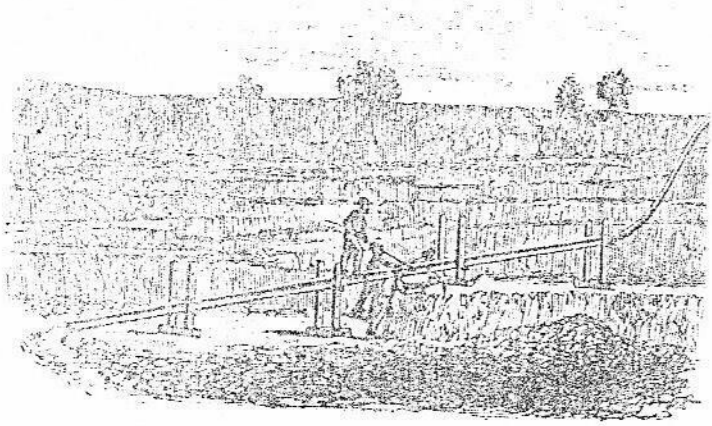
In 1876, the Oriental Sluicing Company was formed as a co-operative in five shares, to work the ground adjoining the Pioneer Claim.

There were only five shareholders in the Company and they were George Henry France (the first manager), Zepherim Champagne, Gilbert Hadden (later manager), Christopher Rodgers, and Mr. Clarke. Subsequently the Clarke share became the property of Joanna Clarke, presumably upon the death of the original shareholder. Joseph Cousins apparently also had a working interest for a period or more likely was a substitute operator in place of Christopher Rodgers, whose other interests would have prevented him taking a permanent role of working partner.

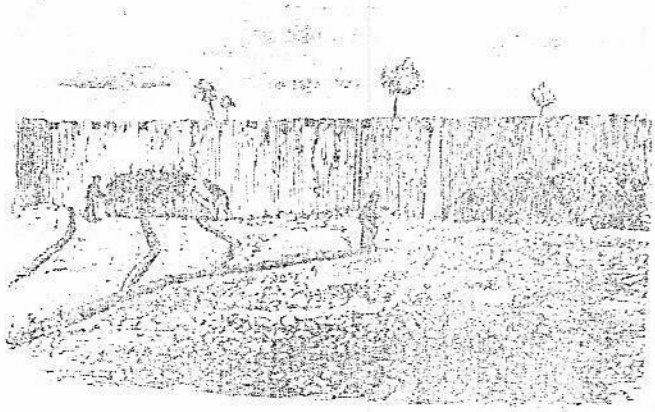
George France and Zepherim Champagne had been working the alluvial ground at Omeo since the early days and they, with others, had operated as the French Company and as had been earlier noted, had been responsible for constructing some of the earliest water races in the area. Champagne had also had interests in the reefing boom of the mid and late 1860's at Swifts Creek.



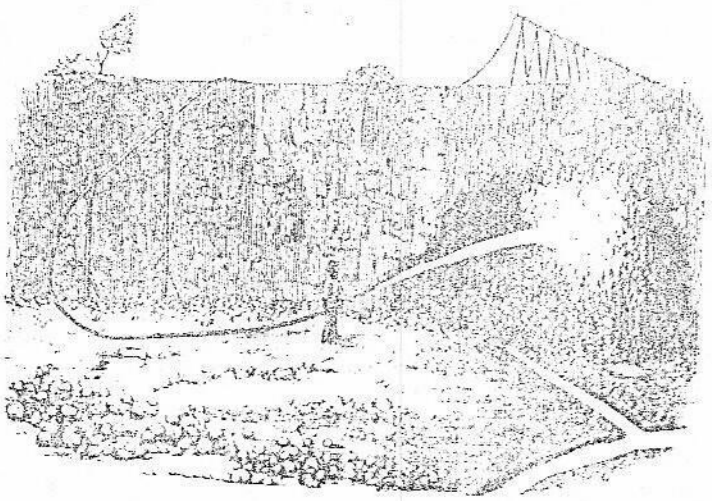
Tomming.



Box Sluicing.



Common Ground Sluicing.



Hydraulic Ground Sluicing.

Christopher Rodgers was a butcher and leading merchant in Omeo and had been elected to the Omeo Shire Council at the first election in 1873. His service to the Shire lasted thirty-three years and he was regularly in the forefront of many actions,both mining and otherwise.

For many years, Rodgers was the largest individual purchaser and trader in gold from the Omeo Region, on occasions handling more than the banks and post office combined. In one year, for example, he accounted for 2,162 ounces of the total production of 3,467 ounces.

The Company promptly proceeded with the cutting of a six mile water-race up the Livingstone valley but although it was substantially completed by the end of 1876, they were unable to have it operating as part of it passed through private property selected for farming and the selectee would not agree to its passage. This matter was not to be resolved for some long time.

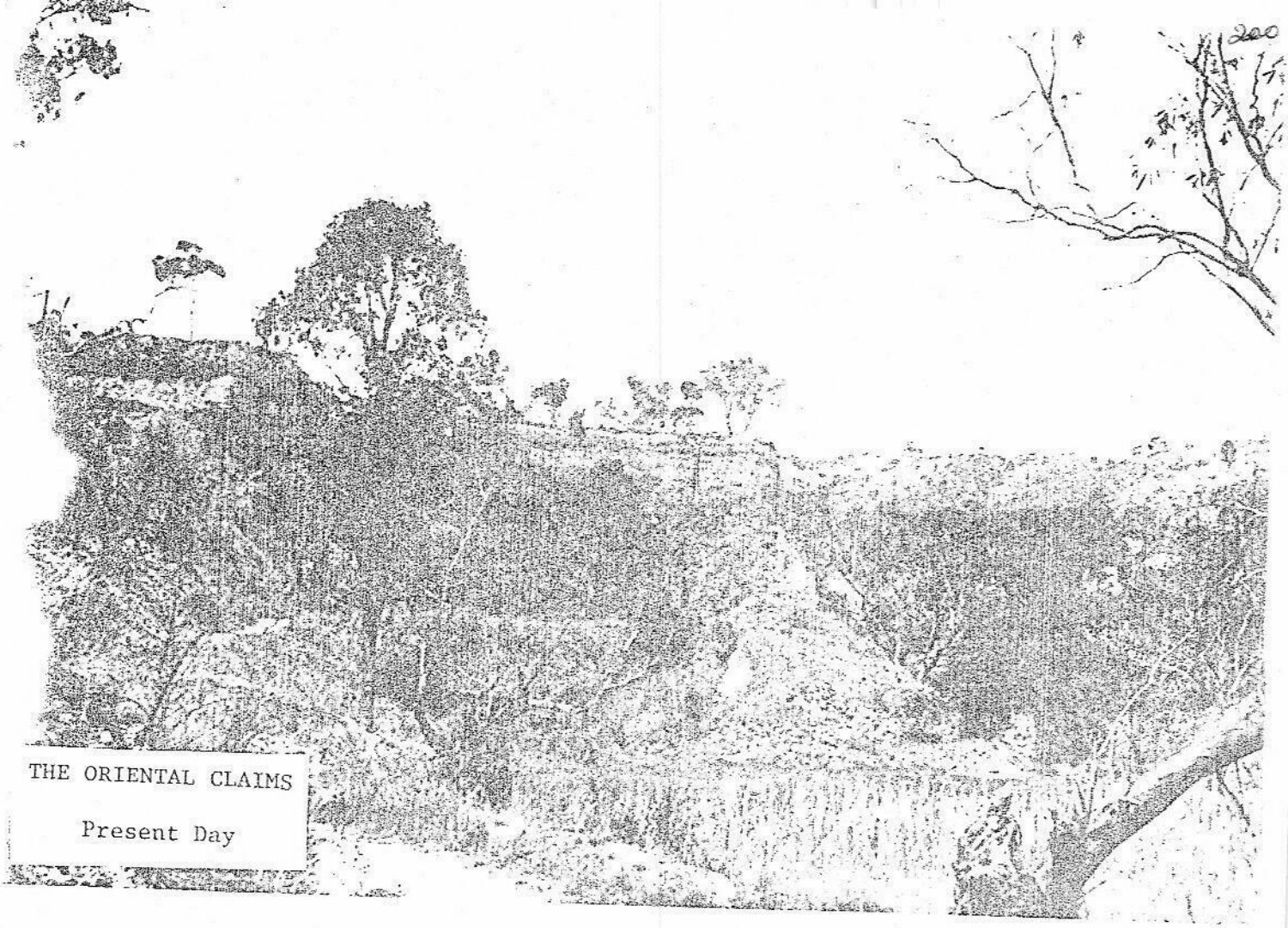
In 1880 and 1881 they adjusted the level of their race so as to command the higher ground on their tenement and extended it until its length was nine miles. It was however, not until action was able to be taken under the then recently enacted Mining on Private Property Act that the matter of the race passing through private property was finally resolved by the granting to them under the Act of Lease No. 367,on 25th January 1885, having an area of 3 roods 36 perches.

Only a few months later they surrendered their amalgamated claims under which they had until then been working in exchange for Gold Mining Lease 778 Gippsland, of 18 acres 3 roods 2 perches, granted for fifteen years, on 1st June 1885.

By March 1886, they had completed the small remaining section of their then nine mile race where it passed through private property, and repaired and cleaned it out for its full length. By June that year they were in full swing with enough water to supply two hydraulic hoses for breaking down and twelve 36 inch sluices and their plant and tenements were then valued at £6,000.

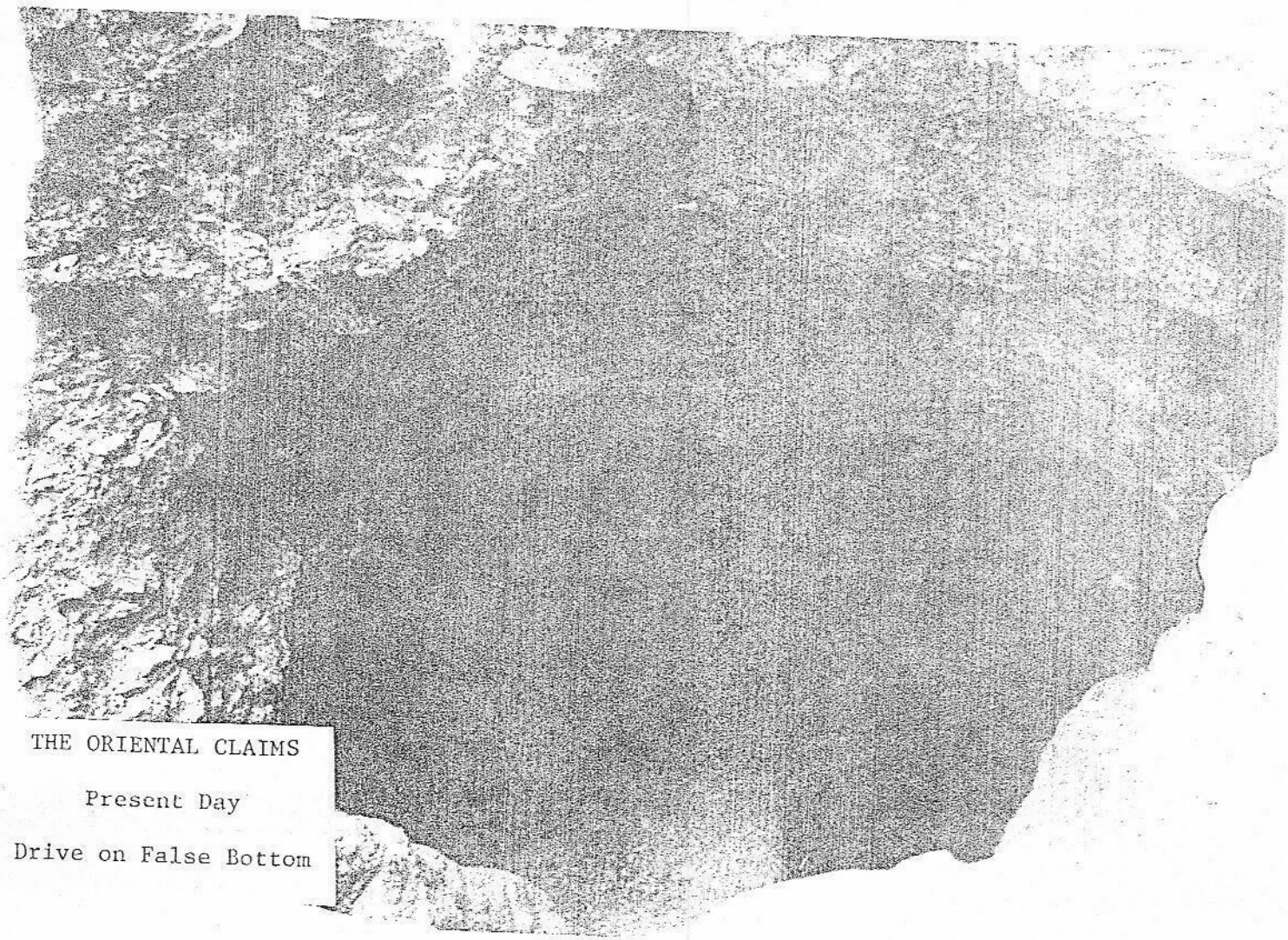
Since commencement in 1876 their water supply had been relatively small and insufficient to allow hydraulicking. It allowed them to clean up only about 50 ounces of gold per annum. From 1886 they had the capacity to produce that amount and more in a quarter.

Interestingly, the years 1881 to 1885 had provided very little rainfall in the Omeo Region, normally permanent springs were drying up or had dried up even by 1884 and 1885, and it is thus doubtful if they had had their long race in use, that they would have had the water to maximise their operation.



THE ORIENTAL CLAIMS

Present Day



THE ORIENTAL CLAIMS

Present Day

Drive on False Bottom

As with Fitzgerald & Co's Pioneer Claim, the Oriental's ground carried average values of about ninepence per cubic yard throughout, or in excess of 5 grains or one-fifth dwt. gold per cubic yard.

Even with the additional water supply however, the nature of their plant apparently then restricted their capacity, as production in the years 1886 to 1888 did not exceed 250 ounces per annum.

In the latter half of 1888 others saw the potential for improvement in the output of the Oriental and Deney & Co. on behalf of a Melbourne syndicate made an offer to purchase.

The Company did not accept the offer, but saw that it would be profitable for them to expand and improve their operations.

THE CHINESE PIONEER CLAIM : 1883 - 1888

It will be recalled that in 1883 a co-operative party of Chinese miners purchased the Pioneer Claims from Fitzgerald & Co. for £1,000.

A worse time for the purchase could hardly have been selected, the early part of a severe period of water shortage and drought that was not to break until 1886, though this could hardly have been forseen.

The years 1883 and 1884 produced only a little gold and in 1885 the works were at a standstill for most of the year. It was not until the latter half of 1886 that water was sufficient for full production at the rates previously obtained by Fitzgerald & Co.

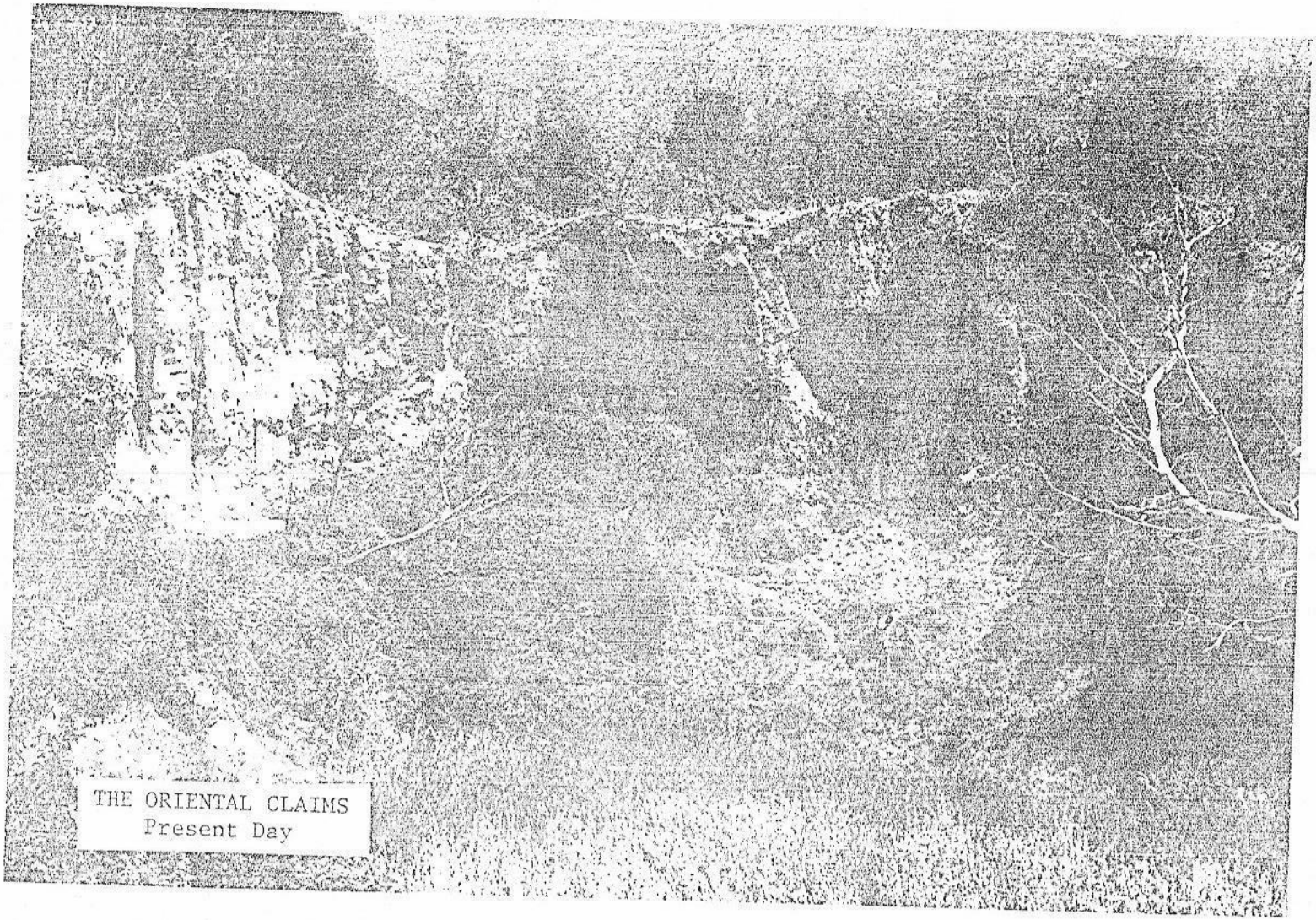
Even then they were not in the happy position now held by the Oriental with their long race and abundant water supply.

In 1889, Richard Nicholls was granted both Lease 1238 of a little over 28 acres which substantially covered the Pioneer Claim area and also Lease No. 1237 of a little over 15 acres to the east of the Oriental. No records of production by Nicholls have been seen and it is assumed that Chinese miners continued to operate on the old Pioneer ground.

It is estimated that in the period 1883 to 1888 the Chinese Pioneer claims produced approximately 1000 ounces of gold.

OTHER DRY HILL/PIONEER HILL CLAIMS

From the earliest days, various parties had worked the banks of Dry Gully and Mountain Creek and to the south the banks of Livingstone Creek between the Pioneer and Bloomfields Gully.



THE ORIENTAL CLAIMS
Present Day

It is taken that Bloomfields Gully is named after Tommy Bloomfield who was in the area and at Swifts Creek in the 1850's, a well known prospector who is believed to have vanished and presumably died on one of his journeys through the ranges.

Most of the claims along Dry Gully and Mountain Creek, nearby to the Pioneer, were operated by Chinese miners. Some were extremely valuable for their size, for example, prior to 1886 almost 2,000 ounces of gold had been taken from Ah Fong and Party's small claim of only two roods at the junction of Dry Gully and Livingstone Creek, opposite the Pioneer. In late 1896, Ah Fong & his party of four other Chinese really hit the record books, cleaning up 500 ounces for eight weeks work.

By the 1880's the most important of the claims near the Oriental and the Pioneer in what we now generally refer to as the Oriental Claims area, were those of Ah Man (whose claim adjoined the Oriental), Ah Chung, Ah Toung, Ah Min (whose claim adjoined the Pioneer), Peter Ah Sen and Ah Hon and their parties.

Others working the ground adjacent to the Oriental in the 1890's were Ah Fi who bought into Ah Sen's tailrace in 1893, Joseph Cousins in his own right and separate from his employment at the Oriental and Ah Pow. Generally both the earlier and later noted groups continued operating until 1904 when stopped by the Sludge Abatement Board.

It is estimated that proudction from the individual claims within the area of the present Oriental Claims Reserve was 21,000 ounces of gold.

THE DEEP LEAD COMPANIES

The possibility of there being very deep alluvial ground, a deep lead, south of the Pioneer and Oriental Claims had been recognised for many years. Test shafts had been sunk in the 1860's and 1870's.

In 1871 or thereabouts, Christopher Rodgers and Party following upon the work of other earlier groups, perhaps including the Pioneer or United Quartz as noted previously in this report, had extended an existing shaft there in search of quartz reef.

In a report upon his visit in 1879, P.O. Whitelaw confirmed that this shaft had been sunk in search of a reef, but as a result of not finding solid rock it had been abandoned but later taken up by others,presumably Rodgers and Party, who sank it through alluviums to bedrock at 268 feet. He noted both that the bottom of the shaft would have been 68 feet below the level of the Pioneer Claim alluvial workings, which gives us some idea of the total thickness of the alluvial ground there and that prospects of gold had been obtained in the shaft in different gravel layers all the way to bedrock.

OMEO IN 1870

For some years, during the 1860's, 1870's and early 1880's similar potentially auriferous deep ground had been sought by parties of both European and Chinese miners in Bloomfields Gully, but without any great success.

In 1883, a new venture named the Omeo Deep Lead Gold Mining Company N.L. was established to test the deep ground south of the Oriental.

Also commonly known as the Omeo Deep Lead Prospecting Company (and even Association), the Company was formed in January 1883 and had a nominal capital of £1,250 in 5,000 shares of two shillings and sixpence each, of which 1550 had been subscribed for at its establishment. The largest shareholder was Christopher Rodgers of the Oriental Company, the legal manager was George France also of the Oriental, whilst one of the shareholders was Henry Foster who was subsequently to become the Minister of Mines.

Its formation in that year appears to have been spurred by a grant of £100 made available from the Government's Prospecting Vote, through the Prospecting Association at Omeo.

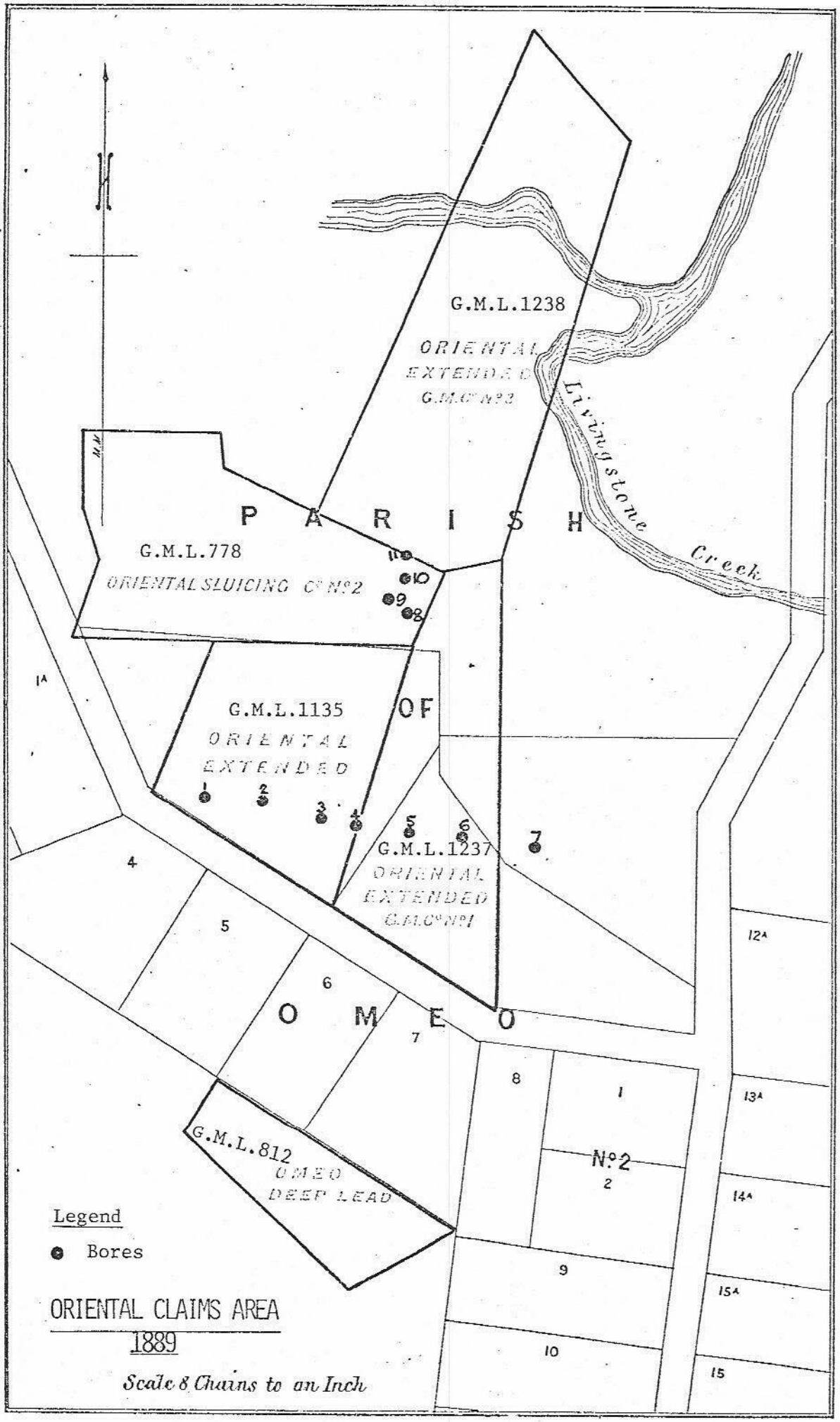
By the end of 1883, they had their shaft down to 170 feet but by 1885 when the shaft was completely timbered and secured to 210 feet the work was suspended, owing to the inflow of water and the insufficiency of capital to purchase and instal appropriate pumping machinery. The Company intended to recommence if they obtained another grant from the Government's Prospecting Vote.

In 1885, a further £100 was made available from the Prospecting Vote, but for some reason was not claimed even though by early 1886, they had deepened the shaft to 260 feet and were erecting a whim.

Early in 1886, three years after formation, the Company finally got around to applying for registration under its correct name. It can reasonably be taken that this action came about in order to both attract further capital and to support an application for a new grant from the Prospecting Vote. James Stirling noted at the time that the shareholders seemed to rely heavily upon Government aid.

They were granted a £1 for £1 subsidy from the Prospecting Vote in late-1886, to carry out further sinking of their shaft but since no additional capital was subscribed, this appears to have been an insufficient encouragement to the shareholders. Work had ceased by mid-year of 1886 and was apparently not recommenced.

One last and final attempt was to be made to test the ground over which Gold Mining Lease 812 of 7 acres 3 roods 19 perches had been granted on 21st December 1885, to Christopher Rodgers and one other.


G.M.L.1238
ORIENTAL
EXTENDED
G.M.C° N°3
Livingstone Creek
P A R I S H
G.M.L.778
ORIENTAL SLUICING C° N°2
G.M.L.1135
ORIENTAL
EXTENDED
OF
G.M.L.1237
ORIENTAL
EXTENDED
G.M.C° N°1
O M E O
G.M.L.812
OMEO
DEEP LEAD
N°2
1A
4
5
6
7
8
1
2
9
10
12A
13A
14A
15A
15
Legend
Bores
ORIENTAL CLAIMS AREA
1889
Scale 8 Chains to an Inch

In April 1888, a new Omeo Deep Lead Gold Mining Company N.L. was registered by Rodgers and Edwin Johnson but this time substantially with Melbourne funding.

The new Company had a nominal capital of £12,000 in 24,000 shares of ten shillings each, of which 12,000 were subscribed for and paid to two shillings at the time of registration. The other 12,000 shares also paid to two shillings were issued to the vendors being the earlier company and Rodgers, in exchange for for their plant and lease.

By mid-1888 they had commenced operations widening the old shaft. The mine manager was W.H. Fisher. By the close of the year a little over £1,400 had been spent, the shaft had been widened out to 10 feet by 4 feet to a depth of 192 feet, a 60 feet poppet head erected and a substantial engine installed. Altogether it looked an impressive operation.

To assist them they received a grant of £350 from the Prospecting Vote, but by mid-1889 when they had their widened shaft down to 200 feet, had driven out from it and found prospects of gold on bedrock, all funds were exhausted and payments of calls were not forthcoming. As a consequence all work ceased. On 5th March, 1890 Judge Chomley in the Court of Mines, Omeo and upon the petition of the Company, ordered its winding up.

A disappointing end to what appears to have been a valid piece of prospecting in which Rodgers obviously had considerable faith.

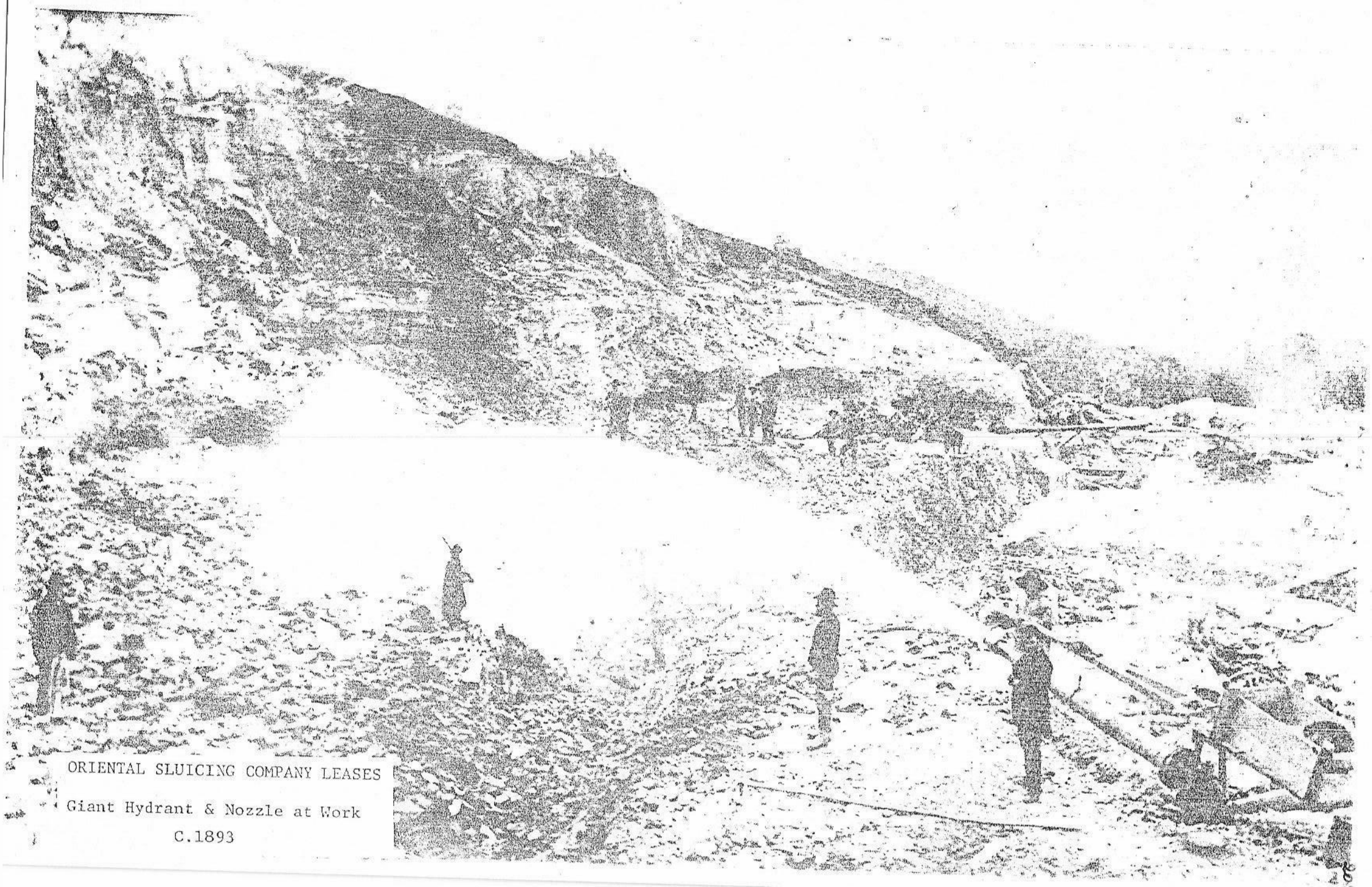
In 1896, the Minister of Mines ordered that the still open shaft be capped, the ground and shaft be taken into the possession of the Mines Department and the shaft be not re-used without the express permission of the Department. It seems that since then no group has made a consistent attempt to prove the probable deep lead.

THE ORIENTAL SLUICING COMPANY : 1888 - 1905

As we have seen earlier, a Melbourne Syndicate had made an offer in 1888 for the Oriental Company's property and rights but wisely this had not been accepted.

However, the offer apparently had a beneficial side effect. It was clear to the partners that it would be profitable for them to expand and improve their operations.

In 1888 they applied for Lease No. 1135 of almost 15 acres and this was granted on 25th February 1889, which then together with Lease 778 gave them almost 34 acres of leased ground for sluicing, in addition to some 25 acres of freehold ground owned by the partners.



ORIENTAL SLUICING COMPANY LEASES

Giant Hydrant & Nozzle at Work

C.1893

At the same time, they deepened their tail race to allow the hydraulicking of deeper ground, they further improved their water supply and reticulation and in 1889 purchased and installed a No. 1 size Giant hydrant and nozzle.

The increase in production as a consequence of the introduction of the Giant hydrant and nozzle and the deeper tail race was significant.

Whereas quarterly gold production between 1886 and mid-1889 had varied from around 40 ounces to a maximum of 100 ounces, the production in late 1889 rose to 275 ounces of gold produced in four months by the five men.

It is recorded that the yearly average production from 1889 to 1891 was 500 ounces.

In 1891, it was stated that the face being worked was sixty feet high, the railrace was 600 yards long and the water-race with its branches was 10½ miles long and capable of providing for fourteen sluice heads.

The average gold return at that time was 6.5 grains per cubic yard, but the head grade was claimed to be about 8.7 grains per cubic yard, the difference being lost through the sluices and discharged with the waste into Livingstone Creek.

Further confirmation of the value of the Oriental's property was provided in 1893. In the latter half of the year a proposal was put together by Adelaide investors to form a company to be known as the Oriental Sluicing Company N.L., which was to purchase the property from Rodgers, France, Hadden, Champagne and Clarke for £3,100 cash and an issue of 14,000 shares credited as fully paid up to £1 each.

James Besford, for the Adelaide interest, reported at the time that:

- The aggregate length of water-race was then 31½ miles which with fluming had cost £4,500 and the water supply was sufficient to treat 1,000 cubic yards per day.

- A No. 3 Giant hydraulicking hydrant and nozzle should be added to the existing No. 1 size and this additional equipment would increase gold production to the range 2,400 to 3,200 ounces per year.

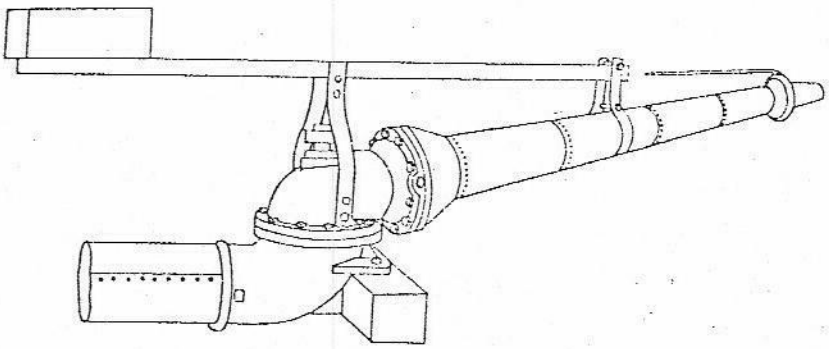
- An on-site test sluicing of 10,000 cubic yards had returned 100 ounces of gold for a total labour cost of £210.

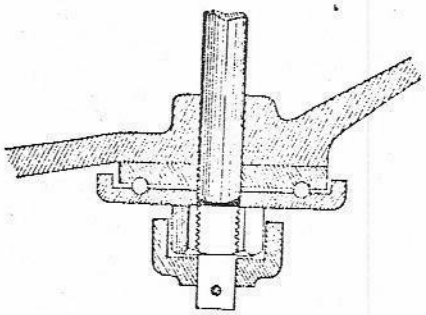
Besford's test indicated a recovered grade of about 4.8 grains gold per cubic yard, that is one-fifth dwt. per cubic yard.

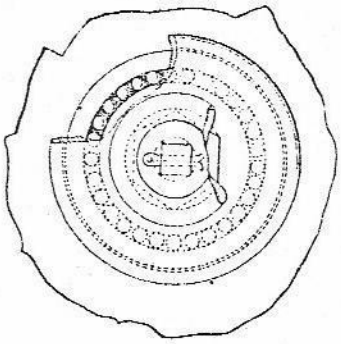
Probably because of the expensive vendor consideration, the proposed establishment of the new company did not come about and the now long established partnership continued on, successfully as before.

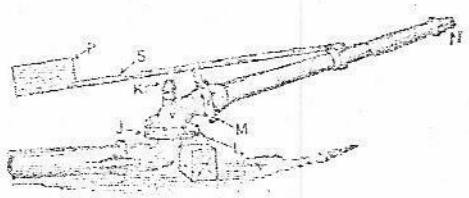
HYDRAULIC GIANT

DOUBLE JOINTED, BALL BEARING

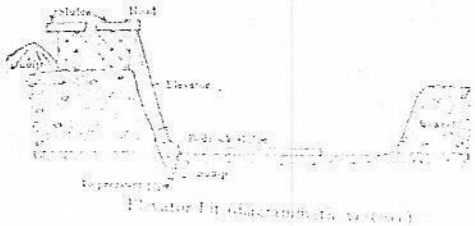


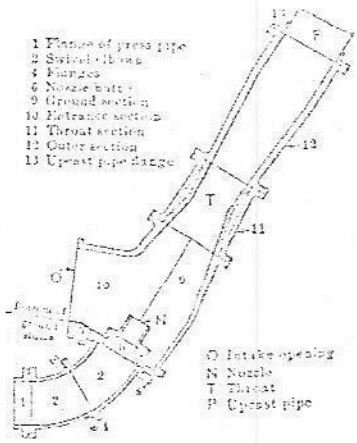






GIANT HYDRANT AND NOZZLE





JET OR HYDRAULIC ELEVATOR

In late 1894, another group, this time from Melbourne showed interest in the property. They employed John Grey in 1895 to inspect and test the property for them.

Grey employed local labour to sink test shafts on the property and stated that:

- The wash was still up to 75 feet deep under the ground already sluiced and that it was obviously an old lagoon filled up with alluvial wash and was the premier alluvial deposit in Gippsland.

- Values in the test shafts ranged from 4.7 to 6.0 grains per cubic yard and that there was no ground of a cash value of less than ninepence per cubic yard.

- Cost of working on a full-time sophisticated basis would not exceed one and one-half pence per cubic yard.

- 50,000 ounces of gold more or less had been taken out of the hill to that time by all parties (but this is not borne out by the facts and is considered to be wildly over estimated).

Again, presumably because of the vendor's selling price, the property remained in the same hands as before. Again shareholders were spurred to improve their operations, this time by improving their races and subsequently reconstructing flumes etc.

In 1896, the Omeo Standard recorded that "the Oriental Company itself has been working for the last thirty years and has returned over 47,000 ounces of gold". That is obviously incorrect as the Company was not formed until 1876 and Gilbert Hadden, the working mine manager, in an interview in 1891, had reported that for the first 11½ years the five shareholders had worked for a return of only eight shillings and sixpence per week since they had been unable for that period to pass their new and long water-race through private property.

Hadden's statement supports the writer's view that from 1876 to 1886 the Company produced about 50 ounces gross per year, say 550 ounces in the noted period. We know also for certain that a rate of 500 ounces per year was not achieved until 1890. From then production fluctuated between 500 and 1,000 ounces per year.

With the passing of time, the working shareholders were finding it more difficult to actually do all of the work themselves and by the mid-1890's the operation was partly undertaken for them individually by substitute employee miners. The shareholders, then of advanced years, worked about half-time.

For the five co-operative shareholders the enterprise still remained rewarding. Wages for the alluvial miners and labourers rarely exceeded £2.5.0. per week, but the gold production often achieved a value of £5.0.0. or more per man per week, a substantial margin for profit even after lease, water-right and plant maintenance costs.

The continuing success of the Oriental Sluicing Company even working well below its obvious greater potential, brought continuing attention to both the undeveloped and underdeveloped terraces of wash down-stream along Livingstone Creek, in Bloomfields Gully and under Omeo township.

Great schemes were suggested for bringing in additional and reliable water supplies to work these deposits, the most impressive being a scheme that had been proposed by Councillor Silk to bring water in by a large 17 mile race from the Victoria River at Cobungra.

That scheme had been intended to provide water for both sluicing and as a permanent town water supply. Unfortunately, it and other schemes did not come about although there were a considerable number of parties working in Bloomfields Gully, on Livingstone Creek downstream from the Oriental and at the Omeo Township who would have been only too willing to pay a reasonable charge for permanent water brought in.

Although they were still delayed from time to time by water shortages, the Oriental Sluicing Company, because of their substantial income, had been and remained the only alluvial mining group that had extensive races providing a more or less adequate water supply.

The very adequacy more or less of their supply attracted its own problems as evidenced by public notices warning of the actions that would be taken against people discovered tampering with the races; a similar problem to that encountered in the early 1900's by the Jirnkee Company with their long race to Tongio West.

In 1899, another group of Melbourne investors proposed a company to be known as the Oriental Sluicing and Dredging Company to purchase the Oriental property and work it. This time the vendors, the five shareholders of the Oriental Sluicing Company were to be paid £4,000 cash and receive 20,000 shares credited as fully paid up three shillings.

John Grey who had previously tested the ground in 1895, re-iterated his previous statements and suggestions that there could well be 300 acres of payable ground at the Oriental, and if the length of payground known to exist along Livingstone Creek was brought into account, then working on a large scale could last for fifty years or more.

Again, this proposal fell through and the five shareholders continued on. They were described then by Grey as aged men who were working no more than half-time.

By 1900, returns from the Oriental were falling a little, not so much from lack of ground or contained gold, but as a consequence of the then changed composition and nature of the co-operative. The shareholder composition was no longer the same as at formation in 1876 and squabbles were becoming common, mostly in respect of the the equitable distribution of income and its relationship to input by the individual shareholders.

An arrangement was made between the then shareholders, that in the event of a shareholder or shareholder's substitute missing a shift, twelve shillings would be paid into the Company per missed shift by the shareholder concerned.

The shareholders were then George France, an original shareholder, Elizabeth Rodgers, Annie Macquarie, James Ryan and Rudolf Von Knuth.

In July 1901, relationships became strained to the point where Von Knuth took the other shareholders before the Warden's Court for resolution of equity in distributions.

It seems that Von Knuth had worked full time for the previous eighteen months, George France had worked almost all of that time, as had James Ryan and his substitute, but that for two months no substitute had worked for Elizabeth Rodgers or Annie Macquarie, and when the substitutes for them, namely, Joseph Cousins and his son had been put on they had worked only on and off. The matter appears not to have been resolved.

Such differences of course are common to co-operative ventures and become more common with time. It however must be reckoned a great shame to see such a long established and successful co-operative finishing its term in an atmosphere of internal bickering.

Finishing its term it was, for in 1904 or thereabouts the Sludge Abatement Board stepped in and stopped all further working until some suitable provision could be made to prevent the tailings entering Livingstone Creek.

Other than inspections by various parties seeking ways to overcome the sludge abatement problem, very little productive work was undertaken again until 1911.

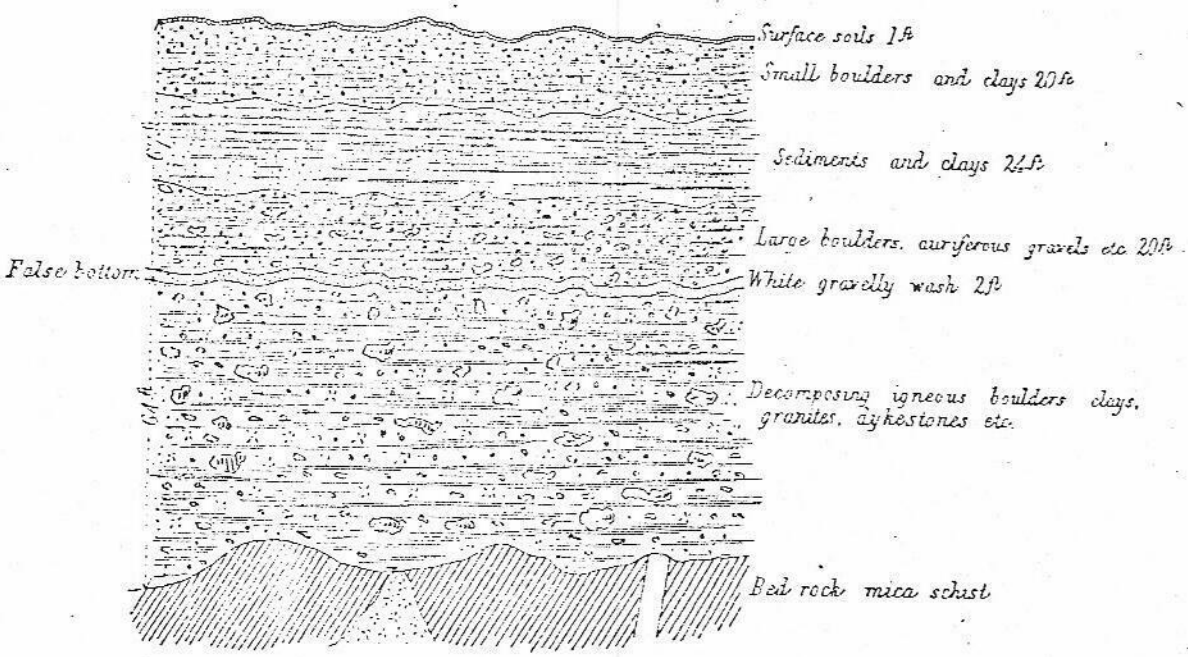
It is estimated that in the period 1876 to 1910, some 12,500 ounces of gold were recovered by the Oriental Sluicing Company.

ORIENTAL GOLD MINING LTD 1911 - 1912

Following the order of the Sludge Abatement Board in 1904 or thereabouts, to cease discharge of tailings and sludge into Livingstone Creek, a number of groups looked at the problem of operating the Oriental deposits within the requirement of the Board.

SECTION THROUGH FACE

ORIENTAL CLAIMS



One person to investigate the probelm was W.Tracey, an hydraulics engineer. He concluded that:

- Over an area of about 230 acres at the Oriental the average recoverable grade from top to bottom in thicknesses up to 100 feet or more would be about 3 grains of gold per cubic yard.

- The requirement of the Sludge Abatement Board could be met by discharging the tailings into the already worked ground and retaining the old tailrace under the bank of new tailings for the purpose of releasing flood waters.
  He concluded that as much as 50 feet of faces could be worked by gravitation and the ground below that worked by a hydraulic jet elevator.

Substantial profits were anticiapted to be generated from the operation and as a consequence a company known as the Oriental Gold Mining Company Limited was formed in Adelaide to operate the property. It had a fully paid up capital of £10,000 in 10,000 shares of £1.

The Company took up mining leases totalling 232 acres and proceeded with its preliminary preparations in 1911. They purchased and installed a powerful pump sluicing plant and elevator, all driven by a 150 horsepower Robey portable engine, the largest to that date imported into Australia.

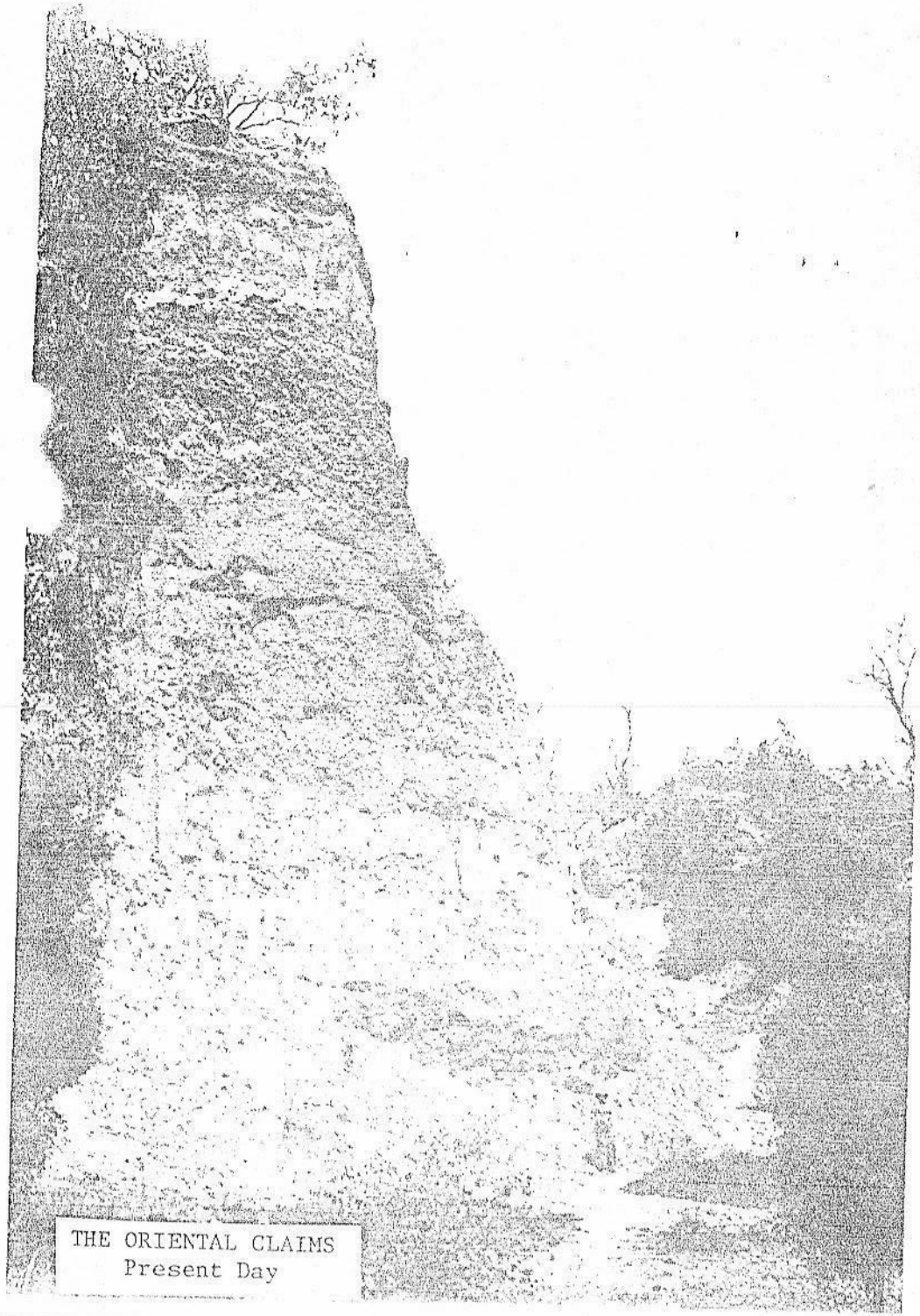
By late 1911, hydraulicking and sluicing had commenced, the tailings being deposited to the north of the working area by elevator into the old ground. The site of the elevator pit can be recognised to this day by the deep water-hole surrounded with rushes.

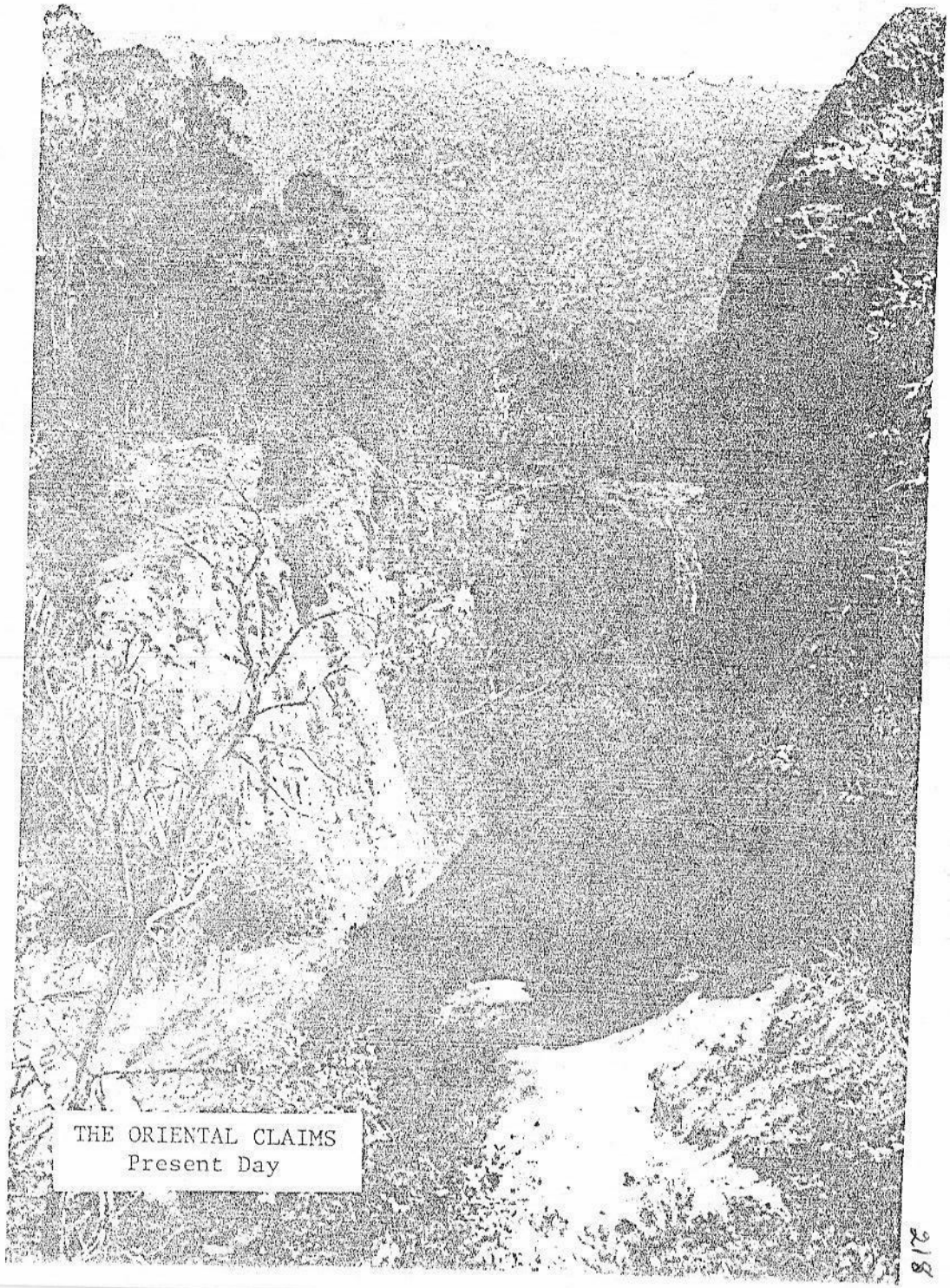
Success was anticipated and there was talk of 25 to 50 men being employed for many years.

Unfortunately this was not to be the case, as its only production was 54 ounces 12 dwts. gold by June 1912, which was valued at £191. It was reported that the plant was inadequate for the task.

PRODUCTION FROM THE ORIENTAL RESERVE

The reasonably interpolated and estimated production of gold from the area of the Oriental Claims Reserves of 105 acres is tabulated as follows overleaf:


THE ORIENTAL CLAIMS
Present Day


THE ORIENTAL CLAIMS
Present Day

Operator	Period - Years	Proudction-Ounces
Pioneer Claim (Fitzgerald & Party)	1858 - 1883	7,500
Various Parties (Ah Man etc)	1857 - 1906 (?)	21,000
Oriental Sluicing Co.	1876 - 1905	12,500
Chinese Pioneer	1883 - 1888	1,000
Oriental G.M.Ltd	1911 - 1912	54
	Say	42,000 ounces

Assuming that the recovered value was one-fifth dwts per cubic yard, the volume of ground treated approximates 4.2 million cubic yards.

Taking a conservative present price of gold at Aust.$150, the value of gold produced approximates $6.3 million.

The production of 42,000 ounces is significantly less than some of the figures quoted in the balmy days of the 1890's and the early 1900's, which were published to support various company flotations. These indicated a total production from within the Oriental Claims Reserves in the range from a reasonable 40,000 ounces to an extravagent 60,000 ounces.

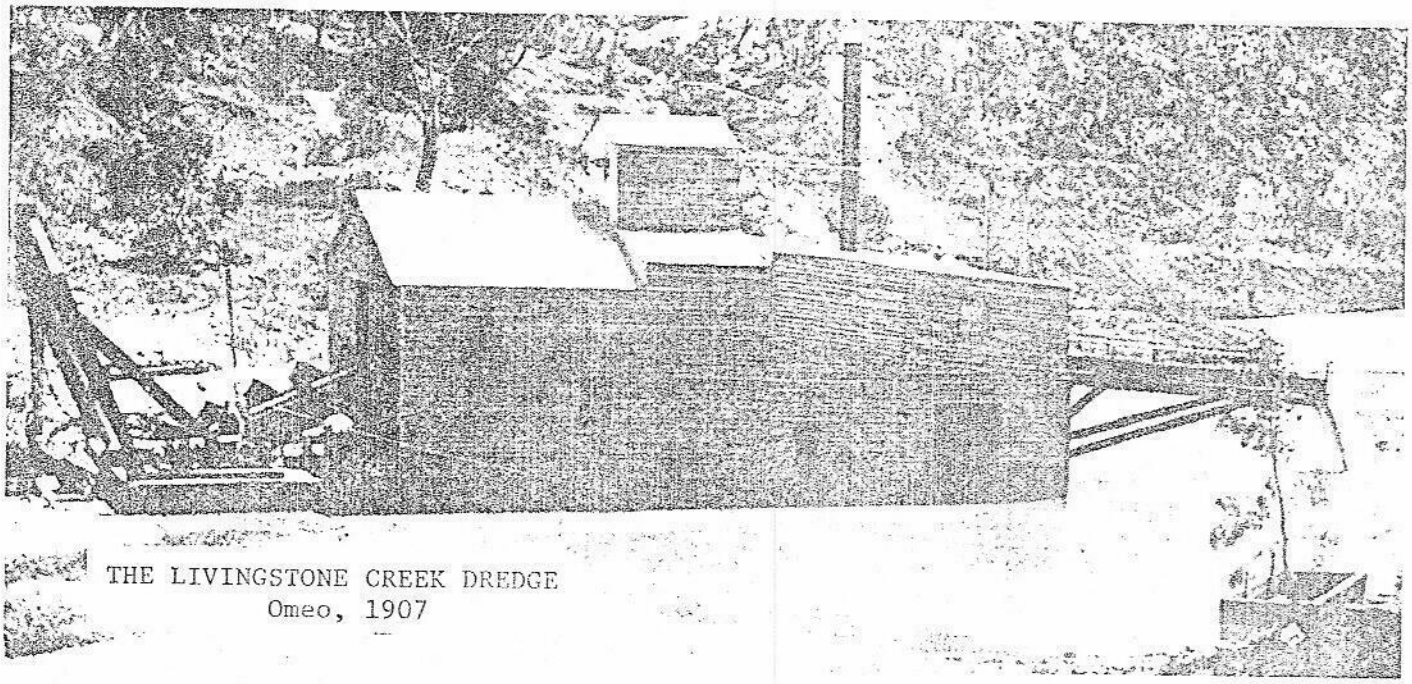
The general validity of the interpolated and estimated figure of 42,000 ounces is well tested when the component for the period of maximum production on the Oriental Reserve, namely 1889 to 1900, is put against the officially recorded total alluvial production of the district in the same period.

From 1889 - 1900, the total officially recorded alluvial production of the Omeo Sub-Division, which included the Gibbo, the Dargo, Long Gully and Swifts Creek, amounted to 19,273 ounces, whilst the estimate for production in the same period from the Oriental Reserve area is 14,500 ounces or about 75% of the total from the Sub-Division.

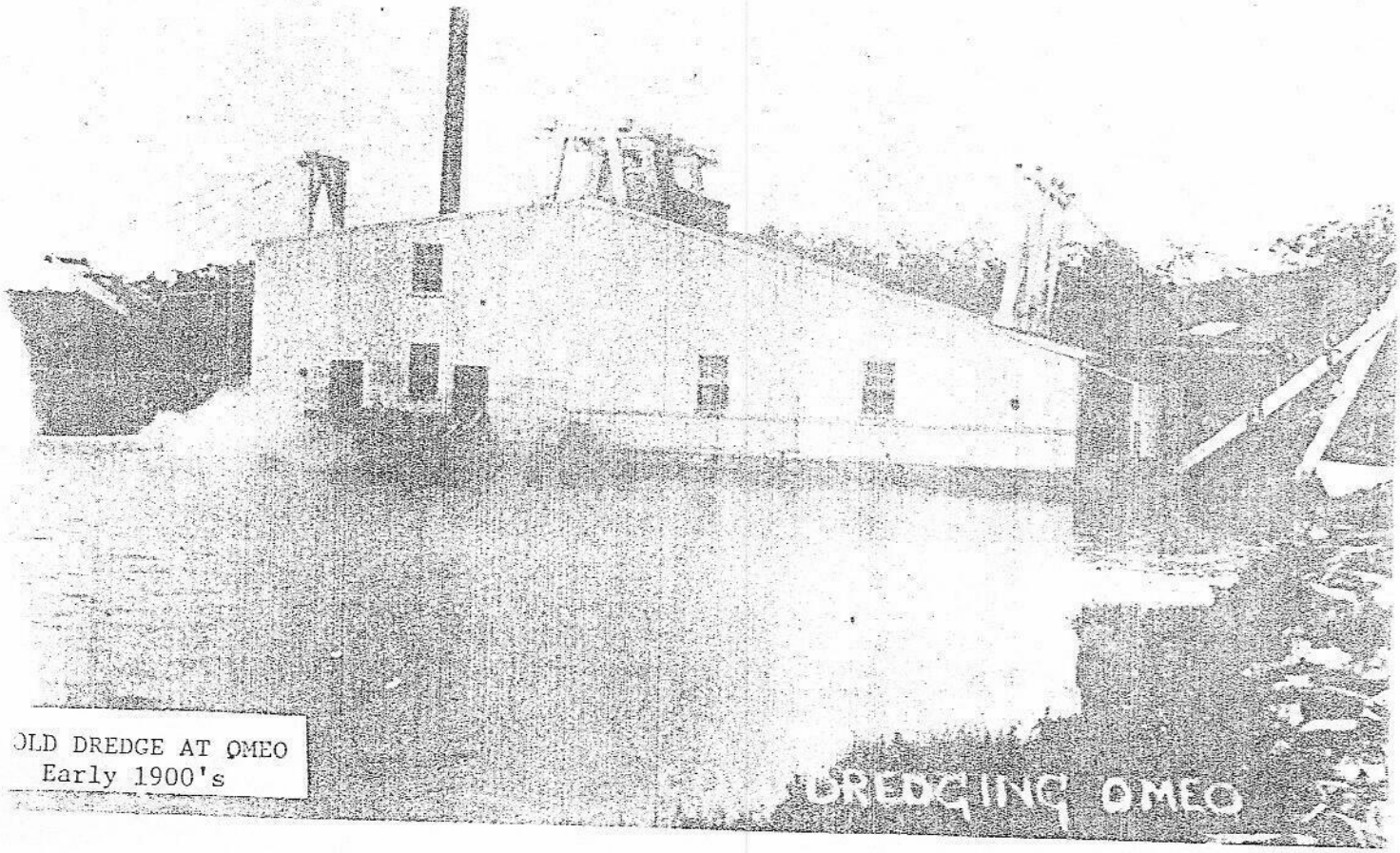
COMPARISONS AND OBSERVATIONS

The alluvial workings on the Oriental Reserve are without doubt the largest and most productive of their kind in the Gippsland region. The average recovered grade of approximately 0.2 dwts. per cubic yard or about 5 grains per cubic yard is exceptional for a deposit of such thickness and compares favourably with almost any other large deposit in Victoria.

For grade comparison it is interesting to note that the average return from all dredging and hydraulic sluicing in Victoria for the period 1900 to 1912 was 2.23 grains per cubic yard, a little less then one-tenth dwt. per cubic yard.



THE LIVINGSTONE CREEK DREDGE
Omeo, 1907



OLD DREDGE AT OMEO
Early 1900's

In terms of like with like it is not possible to make useful comparisons of total gold output on an Omeo regional scale, as there was nothing of a similar and measurable scale to compare it with. However, one can note the following for some impression of output scale,

- The Maude & Yellow Girl reef mine at Glen Wills produced just over 100,000 ounces of gold.

- The Cassilis reef mine, at Powers Gully, Tongio West produced 93,385 ounces between 1898 and 1916.

- The Hinnomunjie Gold Dredging Company further down the Livingstone produced almost 41,000 ounces. The Company paid good dividends even though at times the recovered grade was barely in excess of 1 grain of gold per cubic yard.

and incidentally,

- The unrewarding Livingstone Creek Dredge operating just below the Oriental area in 1900 - 1901 and 1903 - 1907 produced only 4,010 ounces of gold. In its last year the recovered grade was 1.4 grains per cubic yard.

In terms of scale for Gippsland as a whole but not comparing like with like, one notes that 1,500,000 ounces of gold were produced from the Cohens Reef at Walhalla, the richest single gold shoot in Victoria.

On a Victorian scale the alluvial output of the Oriental and associated workings was not exceptional. For example:

- The Band of Hope and Albion deep lead alluvial mine at Ballarat produced over 500,000 ounces of gold

- The Madam Berry deep lead alluvial mine on the Berry Lead produced about 375,000 ounces.

and at Eldorado,

- The Cocks Pioneer Mine operating generally as a hydraulic sluicing operation similar to the Oriental produced 113,500 ounces.

However, for all the comparisons above, one concludes that on an Omeo/East and North Gippsland regional scale, the Oriental Reserve provides an exceptional example of profitable alluvial mining. With what appears to be enormous reserves of payable ground and notwithstanding the problems of sludge abatement and stream pollution, the wonder is that so much remains in a virgin unmined condition.

GLOSSARY OF TERMS

ACID ROCK	(Latin: acidus, sour). - Igneous rocks containing a large proportion (over 66 per cent.) of silica are classified as "acid". Typical examples are granite, quartz porphyry, dacite and obsidian.
ADIT	Passageway or opening driven horizontally into hillside: generally for the purpose of exploring or otherwise opening a mineral deposit.
ALLUVIAL/ ALLUVIUM	Deposits of clay, sand, gravel and such like, deposited by flowing water.
AMALGAM	Mercury alloyed with another metal; usually refers to the alloy of gold and mercury from which the mercury is removed by retorting. The gold content of amalgam usually ranges from 40 to 60 per cent.
AMALGAMATED CLAIM	Claims adjoining one another which have been thrown temporarily or permanently into one claim for more economical working.
AMALGAMATION	A process of gold recovery based on the affinity of gold for mercury. Finely crushed gold-bearing material is brought into contact with mercury with which it forms an amalgam.
ANTICLINE	An arched fold in bedded or stratified rocks.
ANTIMONY	This metal is very rarely found in the native state. It is a tin-white, very brittle metal of crystalline structure, the most common ore being the sulphide mineral stibnite.
ARSENIC	Brittle steel-grey semi-metallic element.
ASSAY	The determination of the mineral contents of an ore by laboratory methods on a representative sample.
AURIFEROUS	(Latin: aurum, gold: ferve, to bear) - Gold bearing.
BACK	The roof of an underground cavity. Also the name given to the downward continuation of a saddle reef beyond where the leg stone dies out.
BACKS	Ore above a level, extending to the surface or to upper levels.

BALL MILL	A fine-grinding machine in which material is fed into a rotating drum or cylinder and ground by the rolling action of steel balls.
BASE METAL	A metal inferior in value to gold and silver, generally applied to the commercial metals such as copper, lead, etc.
BASIC ROCK	An igneous rock, relatively low in silica and composed mostly of dark-coloured minerals.
BATTERY	A group of stampers used for pulverizing rock. The stamps crush inside a mortar box from which a metal screen regulates the size of the discharge.
BLANKET	Any textile material used in ore treatment plants for the purpose of collecting free gold or other minerals.
BLAST FURNACE	A metallurgical furnace in which mixed charges of oxide ores, fluxes, and fuels, are blown with a continuous blast of hot air and oxygen-enriched air for the chemical reduction of metals to their metallic state. Iron ore is most commonly treated in this way, and so are some ores of copper, lead, etc.
BLOW	An extensive outcrop of a reef or ore body.
BOTTOM	Bedrock on which the ore or washdirt rests.
BULLION	Combination of gold and silver in a partly-refined state.
CALCINING	Heat treatment designed to eliminate certain volatile constituents of an ore.
CLAIM	A portion of ground marked off in accordance with the mining by-laws of the district, and held by virtue of miners' rights.
CINNABAR	Sulphide of mercury.
CLASSIFIER	A separating machine which grades crushed material.
CLEAN-UP	The periodical collection of gold or other precious metals from precipitates or amalgams.

COMPLEX ORE — An ore containing a number of minerals of economic value, usually implying difficult metallurgy to extract them.

CONCENTRATION — Elimination of the non-valuable portions of an ore and collection of the valuable contents. Ordinary panning for gold is a simple concentrating action.

CONTACT — Term generally applied to the junction between igneous and sedimentary rock masses.

COPPER — Reddish malleable ductile element.

CORDUROY — A ribbed textile material with a coarse surface used for collecting gold or other metals or minerals from sluice boxes, etc.

CRADLE — A box-like contrivance used for recovering gold from washdirt. The washdirt is fed at the top together with water and passes through a screen and then over riffle tables or bagging where the gold is collected.

CROSSCUT — A level driven approximately at right angles to the direction or course of the strata or reefs, for prospecting or other mining purposes.

CYANIDATION — A chemical process for dissolving gold from finely-divided ores by means of dilute solutions of sodium or potassium cyanides. After the gold has been dissolved, the solution is separated from the ore by filtration and usually the gold precipitated on metallic zinc.

DEEP LEAD — An alluvial deposit located at a considerable depth from the surface in the old course of a buried stream.

DEVELOPMENT — The preparatory work on and in a mine prior to continuous production.

DIP — Angle at which a reef, lode or structure is inclined from the horizontal.

DREDGE — A gold recovery plant mounted on a floating pontoon and equipped with digging, washing, and concentrating apparatus. The washdirt is normally conveyed into the plant by a bucket ladder around which the buckets revolve in a continuous chain, emptying their contents into revolving screens where the washing takes place. Sluice boxes and jigs then concentrate the gold, which is released by the breaking and washing of the dredged material.

DRIVE/DRIFT	Horizontal passage driven along the course of a reef, lode or structure.
DYKE	A long and relatively thin body of igneous rock which intruded a fissure in older rocks.
ELECTROLYTIC REFINING	The process of refining metals by casting into anodes which are placed in an electrolyte consisting usually of a salt of the same metal dissolved in water, and depositing on a cathode by pressing an electric current into the system; similarly, by using an electrically inert anode, and depositing the metal on the cathode from a purified solution of a salt of the metal.
EXTRACTION	The removal of ore from mine workings; the recovery of a metal or mineral from an ore.
FACE	The end of a drive or the wall of a surface excavation.
FALSE BOTTOM	A stratum in alluvial deposits - usually an argillaceous horizontal stratum included within other strata, but differing in composition - on which auriferous gravels rest. In some of the Victorian deep leads several false bottoms may overlie the bedrock.
FAULT	A relative displacement of two or more portions of a rock mass.
FINE GOLD	Finely-divided gold; almost pure gold. Fineness is the proportion of pure gold or silver in jewelry or bullion expressed in parts per thousand. Thus, 925 fine gold indicates 925 parts out of 1,000, or 92.5%, is pure gold.
FISSURE	An extensive crack, break or crevice in rocks.
FLOTATION	Essentially a system of concentration, and consists in the separation of finely divided mineral or ore particles from particles of gangue, etc., by means of gas or air bubbles, the whole mass being kept in a state of suspension and agitation in water.
FLUME	A trough or launder usually mounted on trestles and used to carry water over a depression or around the side of a cliff.
FOLD	When the strata, due to pressure, have formed into an arch, or series of arches or wave-like forms, they are said to be folded. Anticlines and synclines are types of folds.

FOOTWALL — The wall on which the ore body rests; the junction of the ore body and the country rock on the under side of the lode.

GALENA — (Latin : galena, lead ore) - Sulphide of lead; when pure, it contains 86.55 per cent. of lead and 13.45 per cent. of sulphur. Most important ore of lead and source of most of the lead of the world. Galena usually contains silver.

GANGUE — (German : gang, lode) - The veinstone, vein-stuff, or matrix in which metallic ore occurs.

GOLD — An elementary metal, specific gravity 19.32; melting point, 1,061 deg. C. Colour yellow, but varies slightly according to the amount of silver and other metals present. Very malleable and ductile; may be hammered into leaves so thin that 300,000 would not be more than an inch in height. One grain may be spread by hammering over 56 square inches of surface, or drawn into a wire 500 feet in length. Dissolves in aqua regia (a mixture of nitric and hydrochloride acids) or in chlorine; occurs chiefly in the crust of the earth, also in the sea. The purest native gold yet found (99.65 per cent.) is obtained in Australia.

GRADE — The quality or value of an ore. In gold ore the grade is usually expressed as the number of troy ounces of gold in a ton of ore or grams per tonne.

GRANITE — Granular, crystalline, hard igneous rock composed essentially of the minerals felspar, quartz, and mica or hornblende. Usually grey or pink; is used extensively in Victoria as a building stone.

GRANODIORITE — Similar to granite except that plagioclase felspars are in excess of orthoclase. The difference is thus mineralogical and frequently is not evident without examination under the microscope.

GROUND-SLUICE — A channel cut in the bottom or bed-rock, into which the earth is conveyed by a stream of water. It is sometimes lined with sawn planks. False bottoms formed of stout battens, framed together and laid lengthwise in the sluice are occasionally used to protect the wooden bottom from the wearing action of the stones, etc., passing through the sluice. Some sluices are paved with large stones, and others are paved with blocks of wood, grain on end. Ground-sluices are employed where the bottom is sufficiently high to afford the necessary fall for the stuff passed through the sluice.

GUTTER — The lowest portion of a lead filled with drift or washdirt.

HEADFRAME — The wooden or steel poppet legs and platforms erected over the shaft.

HEAD VALUE — The assay value of the ore which is being fed into the mill.

HYDRAULIC HOSE — A common hose used in gold-washing for conveying water to alluvial claims, where by the fall and pressure of the water the detritus is broken down and washed. The canvas hose that was used in California and other countries for hydraulic mining was usually covered with iron rings or close cord netting, and the pressure such a structure bears was very considerable. With a large volume of water, vast quantities of detritus and gravel can be removed with little manual labor. A pressure of from 60 lbs. to 100 lbs. to the square inch was common. Only where the fall is considerable, and water abundant, can hydraulic mining be profitably pursued.

IGNEOUS ROCKS — Rocks formed by the solidification of molten material.

JIG — An apparatus used in milling to concentrate ore on a screen submerged in water, either by a reciprocating motion of the screen or by the pulsation of water through it.

LEAD — A metallic element obtained principally from the mineral galena or lead sulphide. Specific gravity 11.4; melting point 327°C. Soft, with low tensile strength. Heated to redness in air it oxidizes readily, forming litharge. Rarely found in native form; used in many alloys.

LENS — A body of ore resembling a lens in form. It is usually much greater in length than in width.

LENTICULAR — In the form of a lens.

LEVEL — An underground horizontal passage in a mine, driven to give access to ore bodies and to provide for truckways and tramways.

LIME — Calcium oxide is lime or quicklime; calcium hydroxide (formed by adding water) is slaked lime; calcium carbonate is limestone, from which lime or quicklime is prepared by heating. The term "lime" is loosely applied to any material containing calcium.

LIMESTONE — Rock mainly composed of carbonate of lime. Limestones are soft rocks soluble in acid waters, and limestone formations are in consequence frequently hollowed out in caves. Marbles, chalks, corals, marls, and dolomite are all varities of limestone.

LODE — A clearly defined deposit in solid rock, e.g. quartz or metallic ore containing gold, silver or the like.

MERCURY — (Quicksilver) - A metallic element, specific gravity 13.59, melting point 39.5°C. Readily combines with other metals forming amalgams. Colour silver-white. It is the only metal which is fluid at ordinary temperatures. Rarely occurs native, but usually as the sulphide mineral cinnabar.

METALS — Opaque, fusible substances possessing a typical lustre and electrical conductivity.

METAMORPHIC — Changed in form. Rocks are metamorphosed by heat and pressure. Contact metamorphism is caused by masses of igneous rock being injected into the upper part of the earth's crust, resulting frequently in a complete rearrangement of the mineral constituents of the invaded rocks, and the consequent formation of new species. Typical metamorphic rocks are hornfels, schists, etc.

MILL — A collective title given to the concentrating equipment and grinding machinery used to treat and recover metals or minerals.

MINERAL — A mineral is academically defined as "a natural inorganic homogeneous material of such composition that its substance can be represented by a chemical formula". Commercially, however, the term has been extended to include all physically inert constituents of the earth's crust.

In common parlance in the Victorian gold mining industry, the term "mineral" was used commonly to describe the heavy sulphide minerals recovered by concentration, e.g. pyrite, arsenopyrite, copper pyrites, galena, etc.

MONITOR — A large nozzle which directs a stream of water under high pressure on to alluvial ground. It is employed in the branch of mining known as hydraulic sluicing or hydraulicking.

MULLOCK — Waste, barren or uneconomic rock obtained in the course of mining.

OPEN CUT — An excavation for the purpose of working an ore body or deposits of coal, clay, etc., which lie near enough to the surface to obviate usual mining operation.

ORE	Rock material which contains particular metals or minerals in commercial quantities.
ORE RESERVES	The ore stored in bins or hoppers at a mine or actually available for extraction in various parts of the mine.
OXIDES	Compounds of oxygen with various other elements.
OXIDIZED ZONE	The part of a mineralized formation which has been wholly or partly converted into oxides by the combined action of air and water.
PADDOCK	A portion of an alluvial area being worked by hydraulic sluicing. A surface site for storing ore.
PANNING	The method of testing washdirt or finely-crushed lode material for gold or heavy minerals by washing a quantity of it in a dish so that the clay, sand, rubble, etc., are removed and the gold or mineral allowed to concentrate in the rim of the dish.
PLANT	A group of buildings, and especially to their contained equipment, in which a process or function is carried out; on a mine it will include warehouses, hoisting equipment, compressors, repair shops, offices, mill battery or concentrator.
PITCH	Vertical angle an orebody makes between a horizontal plane and the direction along which it extends longitudinally to depth.
PLAT	A long chamber forming the commencement of a drive or level and wide enough to allow for the shunting and handling of trucks.
PLATES	Sheets of copper or muntz metal coated with mercury and used for collecting amalgam.
POPPET-HEAD	A four-legged iron, steel, or timber structure built over a shaft and ranging from 20 feet to about 100 feet in height. It is equipped with pulleys over which the ropes or cables run which raise and lower the cages in the shaft.
PORTAL	Surface entrance to adit.
PYRITES	(Iron) - Mineral sulphide of iron. Very widely distributed; brass-yellow in colour, metallic lustre; used in manufacture of sulphuric acid and red paints. Sometimes called iron pyrites, mundie, or fool's gold. Copper pyrites or chalcopyrite is similar, but contains copper.

PYRRHOTITE	A bronze-coloured lustrous mineral, a compound of iron sulphides, often containing sufficient nickel to be valuable as an ore. Is found in some meteorites.
QUARTZ	Silicon dioxide, commonly known as silica. Colourless when pure, usually milky white in reef or vein quartz.
RACE	A channel for conveying water.
RECOVERY	The amount or proportion of a particular metal or mineral recovered in the treatment of an ore.
REDUCTION	In gold mining, the process of physically separating the gold and metallic minerals from the gangue, for example with a stamp battery.
REEF	A well-defined vein of quartz.
REFRACTORY	The term used in connection with an ore which is difficult and costly to treat for the recovery of the valuable contents; also applied to fire-clay and other materials which withstand high temperatures.
RESIDUE	The worthless or almost worthless material discharged from a mill after treatment for the recovery of gold or mineral.
RETORTING	The process of heating amalgam in order to vapourize the mercury and thus separate it from the gold.
REVERBERATORY FURNACE	A long, flat furnace used in smelting concentrates; its principal function is the slagging of gangue minerals.
RIFFLE	Cross or longitudinal bars in a cradle or sluice box which catch and retain the gold or heavy minerals.
ROASTING	The treatment of ore by heat and air, or oxygen-enriched air, in order to remove sulphur and arsenic.
RISE/RAISE	Vertical or inclined underground opening, excavated from the bottom upward.
SANDSTONE	A sedimentary rock of which the principal constituent is silica or sand. The grains of sand are cemented together in various ways, the most common cementing agents being lime, iron oxide, and clay material. Heat and pressure also play a big part in compacting loose material into a sandstone.

SCHIST — (Greek: schizo, to split) - Rock of metamorphic origin with a fine foliated structure.

SCREEN — A grading device in the form of a sieve and made of woven wire, bars, or punched plates.

SEDIMENTARY ROCKS — Secondary rocks formed from rock particles transported from their sources, usually by water; for example, sandstone, mudstones, siltstones, shales, slates, limestone.

SHAFT — A vertical or inclined excavation for the purpose of opening and servicing a mine. It is usually equipped with a hoist at the top, which lowers and raises a conveyance for handling men and material.

SHOOT — The auriferous portion of a lode; also the term sometimes used instead of "chute".

SILVER — Metallic element, soft, malleable. Native silver is much rarer in occurrence than native gold, but may occur in the vicinity of silver-bearing or other associated sulphide minerals, such as argentite, galena, etc. Argentite is the principal ore of silver.

SLIME — Finely-divided material which remains in suspension in water for a long period.

SLUDGE — A mud-like pulp.

SLUM — The fine clay and decomposed rock material carried away by water from a puddling machine.

SORTING — Classification of ore into economic and waste material.

SPECIMEN — Usually refers to quartz containing visible gold - unlikely to be a representative sample of ore.

SLUICE — A trough-like box with riffles or blankets placed in it. Set at a slight incline, it is used as a gold-saving device as the water passing through it deposits in the riffles or blankets any gold it may contain; also the term used for the method of hydraulic mining known as sluicing.

SLUICE-BOX — See Sluice

SLUICE-HEAD — A box fixed at the head of a water-race to gauge or measure the quantity of water diverted from a river or stream. The measure of the quantity of water which a miner may divert under the bye-laws. He may divert one or more sluice-heads, according to the extent of his permit.

STAMPER-BOX — An oblong cast-iron box in which the stamp-heads work. One, and sometimes two if its sides are open, and in these spaces the gratings are fixed.

STAMP-HEAD — A cast-iron weight or head fixed on to a shank or lifter, and used for stamping or reducing quartz to a fine sand.

STONE — Usual mining name for quartz or lode material.

STOPE — Excavation in a mine from which ore is being or has been extracted.

STOPING — The operation of removing ore from a mine by means of stopes.

STRAKE — A wide trough, slightly inclined, and covered with a blanket or with corduroy for collecting coarse gold or minerals.

STRATA — A series of rocks in layers, each layer being a stratum.

STRIKE — Dip and strike should be considered together. The dip is the inclination of a bed measured in degrees from the horizontal. The strike is the direction of the outcropping edge of an inclined bed on a horizontal surface (such as it would be on a flat plain) and is generally recorded in degrees from the north or south.

STRINGER — A thin seam or vein.

SULPHIDE — Compounds of sulphur with metallic elements. Galena is a lead sulphide; cinnabar is a mercury sulphide; iron pyrites is iron sulphide.

SULPHIDE ZONE — The portion of a mineralized deposit in which the original minerals have remained unaltered (cf. "Oxidized zone").

SUMP — A low-level reservoir for drainage or storage.

SULPHUR — Yellow, brittle, non-metallic element which combines with metals forming sulphides. Occurs in the free state in volcanic districts.

SYNCLINE — Downarched fold in bedded or stratified rocks.

TABLE	A machine with a table-like surface covered with riffles and used for the concentration of heavy minerals. It is given a horizontal shaking motion and the pulp which is passed over it is sorted according to weight.
TAILINGS	The detritus carried off by water from a battery, treatment plant, or sluice.
TAIL RACE	An artificial channel which drains a sluicing claim or conveys used water away from a mill or puddling machine.
TON	In mining, reference may be made to three types of tons. The long ton, which was most commonly used as a measurement in Victoria, contains 2,240 lb, the short ton contains 2,000 lb. and the metric ton (tonne) contains 1,000 kilograms or 2,204 lb.
TRAM	To haul cars of ore or waste in a mine.
TRIBUTOR	A miner who works on his own behalf a section of a mine owned by a company, and who pays as royalty a percentage of the value of the gold or mineral he recovers.
TUNNEL	A horizontal underground passage that is open to the atmosphere at both ends; the term is loosely applied in many cases to an adit, which is open to the atmosphere at only one end.
UNDERLAY/ UNDERLIE	Angle of inclination of a reef. See dip.
VANNER	A concentrating machine in which minerals are sorted according to weight by shaking belts and streams of water.
VEIN	Applied in geology to fissures and rents in the earth's crust filled with mineral or metallic matter, usually deposited from solutions. These deposits may be metallic or non-metallic; as a general rule the two kinds are found in veins together. The non-valuable mineral deposit in a vein is known as the gangue.
VOLCANIC ROCKS	The class of igneous rocks that have been poured out or ejected at or near the earth's surface, as from a volcano.
WASHDIRT	The auriferous gravel, sand, clay, or cement in which the greatest proportion of gold is found.

WASHDIRT DRIVE	A drive cut or constructed wholly or partly through or in wash-dirt.
WASHING	The whole operation of cleansing gold from washdirt.
WASHING-OFF WASHING-UP	The cleaning out of the boxes, tables, blankets, etc., in quartz crushing, and of the puddling machines, buddles, sluices, etc., in alluvial washing. The resulting gold is got by this operation. The last process of separating gold from the associated sand, etc., by hand, after the process of separation has been carried to its utmost by machinery.
WATER-RIGHT	The right (in what manner soever acquired) which a miner enjoys who takes or diverts water from a spring, lake, pool, creek, river or reservoir.
WHIM	A structure of strong timber keeping in position a large horizontally working drum, around which the ropes attached to the buckets working in the shaft are wound. Underneath the drum there is a long beam with shafts, to which a horse is harnessed. The horse by walking round rotates the drum and raises the buckets.
WINDING MACHINERY	Machinery which hoists or lowers the cages in a mine shaft.
WINZE	Vertical or inclined underground opening sunk from a point inside a mine.
WORKINGS	The title given to all the openings in a mine and thus including the shaft, drives, winzes, rises, and stopes.
ZINC	Bluish-white brittle metal of much economic importance. Native zinc has been found but the chief sources of the metal are sphalerite and calamine (a zinc silicate with water chemically combined).

REFERENCES

Listed below are the majority of reference materials and documents used in carrying out the Study.

Newspapers and General Periodicals

The Age
The Argus
The Australasian
The Bairnsdale Advertiser
The Gippsland Guardian
The Gippsland Times
The Omeo Standard
The Omeo Telegraph
The Weekly Times

Technical Periodicals

Australian Mining Standard
Chemical, Engineering and Mining Review
Colonial Mining Journal, Railway and Share Gazette
Dickers Mining Record
Mining Chronicle

Learned Society Transactions and Proceedings

Australasian Institute of Mining Engineers
Royal Society of Victoria

Government Publications - General

Company Records and Reports
   Public Records Office
Letters from Warden at Bairnsdale
   Public Records Office
Proposed Recommendations, Alpine Area, 1978
   Land Conservation Council, Victoria
Report on the Alpine Study Area, 1977
   Land Conservation Council, Victoria
Victoria Government Gazette

Government Publications - Mining

Gold Fields Register Books (1857-1859)
Reports of the Mining Surveyors and Registrars (1859-1891)
Mineral Statistics of Victoria (various years)
The Gold Fields of Victoria (1897-1915)

Annual Reports of the Mining and Geological Survey of Victoria, the Geological Survey and the Mines Department (various years 1863-1950's)

Progress Reports of the Geological Survey of Victoria (various years 1874-1899)
Monthly Progress Reports of the Geological Survey of Victoria (1899-1900)
Records of the Geological Survey of Victoria (various years 1902-1937)
Mining and Geological Journal (various years 1937-1970)

Miscellaneous published and unpublished Reports and Surveys

The Gold Fields and Mineral Districts of Victoria R. Brough Smyth (1869)
Auriferous and Mineral Resources of the Colony (1879)
Report and Evidence - Royal Commission on Gold Mining (1891)
Loss of Gold in the Reduction of Auriferous Veinstone in Victoria, Henry Rosales (1895)
Gold and Mineral Record, J.P.L. Kenny (1946)
Gold and Minerals, W. Baragwanath (1946)
Gold Deposits of Victoria, Bowen and Whiting (1973)
Conference on Gold Deposits in Victoria Papers Presented (1974)

Other Reports

Report on the King Cassilis Mine Area R.G. Wells, Tanganyika Holdings Ltd. (1974)
Report on the Cassilis Mine Area R.G. Wells, Tanganyika Holdings Ltd. (1974)
Report on Cassilis Gold Mining Field Development and Migration Commission (1928)
Various Reports for Planet Gold Ltd. Bruce Cozens, John Taylor and Sons and Others (1966-1970)
Various Reports to the Cassilis Syndicate Ltd. and The National G.M. & M. Co. Pty. Ltd. Sir Herbert Gepp, W.J. Rose and Others (1932-1933)
Omeo: Tourist Development Plan Heffernan & Sanders Pty. Ltd. (1973)

Technical Books, etc.

Australian Mining & Metallurgy, Donald Clark (1904)
Handbook to Victoria
British Association for the Advancement of Science (1914)
Mining Engineers Handbook, Robert Peele (1918)
Regional Guide to Victorian Geology
J. McAndrew and M.A.H. Marsden (1973)
Textbook of Ore Dressing, Robert H. Richards (1909)
Virgin Gold and How To Win It, James Holt (1896)
Various Manufacturers Catalogues (1888-1905)

Books Various

Australian Handbook and Almanac (1875 etc.)
Bailliere's Victorian Gazetteer and Road Guide (1865 etc.)
Book of the Bush, George Dunderdale (1870)
Cyclopedia of Victoria (1905)
Echoes from the Mountains, A.M. Pearson (1969)
History of Gold Discovery in Victoria, James Flett (1970)
Pictorial History of the Victorian Goldfields
James Flett (1977)
Recollections of a Victorian Police Officer
John Sadlier (1913)
Recollections of Early Gippsland Goldfields
Richard Mackay (1916)
Time to Remember, Keith McD. Fairweather (1975)
The Alps at the Crossroads, Dick Johnson (1974)